

ANAESTHESIOLOGY

Edited by P. C. Lund, M.D., Anaesthetist, Deer Lodge Hospital

Abstract

Hypobaric Pontocaine Spinal Anaesthesia, 1,640 Consecutive Cases. Anaesthesiology, P. 181-199, March, 1947. P. C. Lund, M.D., and A. C. Rumball, M.D., Winnipeg, Canada.

Spinal anaesthesia is a form of regional anaesthesia produced by the injection of a local anaesthetic drug, in suitable dosage and properly diluted, into the subarachnoid space of the spinal canal. The local anaesthetic agent may produce a block of one or more of the following structures within the spinal dura: the posterior spinal or sensory nerve roots, inducing analgesia; the anterior spinal or motor nerve roots, inducing muscular relaxation; the sympathetic ganglia, inducing visceral anaesthesia and vascular dilatation.

Total block of all the sensory nerve roots produces no immediate alarming constitutional effects as far as we know; thus the hazards in spinal anaesthesia are either too extensive blocking of one or both of the other two structures lying within the subarachnoid space. Extensive blocking of the motor roots may produce paralysis of the muscles of respiration with consequent asphyxia or even cessation of respiration. Similarly, extensive blocking of the sympathetic ganglia may produce the syndrome known as "spinal anaesthetic shock" manifested by drop in blood pressure, peripheral vascular collapse, cerebral anemia, cyanosis, pallor, nausea and vomiting.

The ideal local anaesthetic agent for spinal anaesthesia, then, is one which in each instance induces maximum sensory anaesthesia and sufficient muscular relaxation for the proposed operative procedure, with a minimum of blocking of the sympathetic ganglia. In order to effect the above ideal spinal anaesthetic conditions, the agent must be dilute, nontoxic and possess physical properties which enable accurate control of its spread within the subarachnoid space.

We believe that hypobaric pontocaine is the agent which most closely approaches this ideal at the present time. Barbotage, and convection by gravity are the two most important factors in determining the extent of spread of an anaesthetic solution within the subarachnoid space.

Barbotage, however, introduces variable factors which are very difficult, if not impossible, to control accurately. Convection by gravity, which

is checked by the absorptive affinity of nerve tissue for local anaesthetic drugs, is governed by two factors: first, the difference in specific gravity between the injected solution and that of the spinal fluid; second, the position of the spinal canal. These two factors can readily be controlled by the anaesthesiologist; hence convection by gravity is the most scientific method of controlling accurately the spread of a local anaesthetic solution within the subarachnoid space.

We wish to describe in detail several techniques which we have developed using hypobaric pontocaine in a 0.1 per cent 0.075 per cent and 0.05 per cent solution, respectively. These solutions are prepared by dissolving pontocaine (niphanoide) in triple distilled water (ampules). More recently, the 0.1 per cent solution has been made available in ampules containing 20 mg. of pontocaine (Winthrop).

In general it may be stated that the 0.1 per cent solution is utilized for prolonged surgical procedures requiring maximum muscular relaxation. It is warmed only if high levels of anaesthesia and analgesia are required, or when unilateral or very rapid onset of anaesthesia is desirable. The 0.05 per cent solution is employed when sensory analgesia is required with but little, no, or in any case very localized muscular relaxation, as in hemorrhoidectomies. The 0.075 per cent solution is utilized in operative procedures, the requirements of which fall between the above two extremes. Also, it is warmed only when unilateral or very high levels of anaesthesia are required.

The pH of hypobaric pontocaine 0.1 per cent solution is 5.6. The specific gravity of hypobaric pontocaine 0.1% at 37 C. is 1.003 and at 45 C. it is 1.001. The specific gravities of the 0.075 per cent and 0.05 per cent solutions, respectively, are slightly less than that of the 0.1 per cent solution. The specific gravity of spinal fluid is approximately 1.007. Thus these three hypobaric pontocaine solutions are readily controlled by convection by gravity.

The optimum rate of injection of hypobaric pontocaine when employing the Etherington-Wilson technic appears to be 1 cc. per second. However, when employing the modified Jones technic (or lateral technic) and the "prone technic" the optimum rate of injection depends on several factors, such as position of the patient,

level of anaesthesia desired and the dose of anaesthetic solution injected. We feel that close attention to these details is of paramount importance if uniform and accurate results are to be obtained.

The local anaesthetic at site of puncture includes ephedrine (5-25 mg.), depending on operation, age, blood pressure, etc. Ten or twenty milligrams of pontocaine hydrochloride (niphonoid) is dissolved in sufficient triple distilled water (ampules) to prepare the desired strength of solution (e.g. 20 mg. in 20 cc. is used to prepare the 0.1 per cent solution). The predetermined dose is injected with a syringe at room temperature, at a rate of 1 cc. per second. The back is straightened to the vertical as soon as the spinal needle is in position and held thus, the desired length of time, after which the patient is quickly and gently placed in the Trendelenburg position. An anaesthetic record is kept routinely of blood pressure, pulse and respirations, and an intravenous infusion is started in most major cases.

The lateral technic: The patient is placed in the lateral position with the affected side uppermost, the table being level or inclined up or down, depending on the level of the anaesthesia desired. The needle is inserted as before and the predetermined dose of anaesthesia solution injected at a rate depending on the factors mentioned. For sacral and lower lumbar anaesthesia the patient is placed in the lateral Trendelenburg position, the bevel of the needle turned caudad and the solution injected very slowly. After injection the patient is immediately placed in Trendelenburg or Depage's position, depending upon the site of operation.

Patients requiring unilateral anaesthesia are placed in a position as previously mentioned, but the bevel of the needle is turned to the homolateral side or inclined cephalad. Patients requiring high unilateral levels of anaesthesia, such as for nephrectomies, are placed in the lateral Fowler position, the table being inclined 20-45 degrees with the horizontal as soon as the spinal needle is in place. Timing is carried out as with the Etherington-Wilson technic, and after the patient is left the desired length of time in this position, change is quickly made to the lateral Trendelenburg position, which obtains for the remainder of the operation. Patients requiring low unilateral levels of anaesthesia as for orthopedic and neurologic procedures involving the lower extremities, are placed in the lateral Trendelenburg position as soon as the spinal needle is in place, and left thus until the surgical procedure is completed.

This technic enables the anaesthesiologist to control more accurately the segmental levels of anaesthesia and smaller doses of the anaesthetic

drug are necessary. It does not produce absolute unilateral anaesthesia, but appears to approach this ideal more closely than do other techniques.

The Prone Technic: The patient is placed prone with the table slightly flexed at the lumbar region. The hypobaric pontocaine is injected very slowly at an even rate to prevent undue mixing with the spinal fluid and to induce it to float along the posterior aspect of the cord. The head of the table is then inclined up or down long enough to enable the anaesthetic solution to reach the desired level before being postured below the horizontal. The patient is kept prone three to five minutes before being turned on his side if this position is required. This technic should theoretically at least induce maximum sensory analgesia with minimum anterior motor root block; clinically we have also found this to be the case. (Most patients undergoing operation for nucleus pulposus, though having sensory analgesia, are able to move many joints of their lower extremities and some have been able to move over onto the stretcher from the operating table unassisted).

In table I is shown a summary of 1,640 consecutive cases in which the patients were anaesthetized with hypobaric pontocaine solution. Supplemental pentothal sodium was administered "routinely" to 177 patients (10.8 per cent), i.e. because of apprehension, nervousness, or desire to be unconscious. Included in this group are the 3 cases of subtotal gastrectomy and other patients having high upper abdominal operations to whom pentothal sodium was administered to prevent discomfort and retching caused by "mesenteric tug" or indirect traction on tissues above the level of segmental anaesthesia. Pentothal sodium was also administered to 87 patients (5.3 per cent) because of pain experienced before completion of the surgical procedure. Over 50 per cent of the cases thus supplemented occurred in two groups of operations; herniotomies and orthopedic operative procedures on the lower extremities. In the latter group pain was usually caused by tourniquet which stimulates sympathetic pathways despite adequate segmental anaesthesia.

Analeptics—Only 9 patients in this series required analeptics during operation: 2 cholecystectomies, an exploratory laparotomy with generalized carcinomatosis, a ruptured appendix, nephrostomy, 2 nephrectomies and 2 subtotal gastrectomies. However, 0.2 to 0.5 cc. of "pitressin and ephedrine" combined or iii mins. of neosynphrin produced an excellent response in pulse, respirations and blood pressure. We do not think that there were any cases of nausea other than that caused by manipulation of the gastrointestinal or biliary tract. There was a moderate fall in blood pressure concurrent with an increase

Table I—

TOTAL SERIES

Types of Cases	No.	Supplementation		Maximum Duration of Operation
		Routine	Fain	
Lobectomy.....	1	1	....	220
Splenectomy.....	2	1	....	70
Sub-total Gastrectomy.....	31	31	....	185
Other Gastric Surgery.....	6	1	1	80
Bowel Reactions and Anastomoses.....	7	4	....	225
Cholecystectomies.....	34	19	1	110
Other biliary surgery.....	4	3	....	125
Perforated Ulcers.....	5	1	....	65
Thoracoplasty (rib resections).....	5	1	1	90
Nephrectomies.....	19	7	3	140
Other renal surgery.....	20	5	....	135
Nucleus Pulposus.....	62	3	7	205
Operations on Spine.....	3	....	....	85
Abdominal Perineal.....	4	2	2	145
Mickels Liverticulum.....	3	....	....	70
Appendectomies.....	267	21	11	150
Exploratory Laparotomy (upper).....	21	6	....	105
Exploratory Laparotomy (lower).....	29	12	4	105
Ventral and Incisional herniotomy.....	51	7	4	115
Lumbar Sympathectomy (abdominal).....	2	....	....	155
Colostomies and Closures.....	8	....	....	85
Transurethral Resections.....	42	....	1	110
Cardiospasm (diagnostic).....	1	....	....	60
Herniotomies.....	315	12	20	90
Rectal and Pilonoidal.....	339	3	5	70
Genito Urinary.....	59	2	3	150
Lower Extremities.....	291	35	24	120
Diagnostic (lower extremity).....	9	....	....	....
TOTAL.....	1640	177 or 10.8%	87 or 5.3%	....
Deaths on operating table.....			1	
Deaths attributable directly to Aesthesia.....			0	

in pulse rate, the premonitory sign of shock, in only 3 cases, a subtotal gastrectomy; a perinephritic abscess; and a nephrectomy.

In general we have found that there is a decrease in pulse rate, in nearly all cases, in low as well as medium and high spinal anaesthesias; also in nearly all cases there was an early slight rise in blood pressure, which was maintained to a greater or lesser degree throughout. This was probably caused by the ephedrine given in the local anaesthetic at the site of puncture. We have also noted only slight decrease in respiratory excursion, even in patients receiving high spinal anaesthesia, both clinically and on actual measurement of chest expansion (preanaesthetically and postanaesthetically). This is due, we believe, to the fact that the sensory analgesia with hypobaric pontocaine extends two to four segments higher than the motor block. This, of course, greatly decreases the risk in high spinal anaesthesia.

In table II is shown, in chronological order, a summary of the 16 cholecystectomies performed upon the patients over 45 years of age. The Etherington-Wilson technic and the 0.1 per cent hypobaric solution were used in each case. Nasal oxygen was administered to a majority of the

patients, and 50 per cent received an infusion (amounts indicated) while only 2 senile patients (age 63 and 66) were given a prophylactic transfusion. Excellent relaxation was present throughout in all cases and thus the only supplemental anaesthetic agent required was pentothal sodium; in 8 cases it was given "routinely" and in one case it was required because of pain caused by visceral traction. The average dose of pentothal sodium was less than 0.5 Gm. An analeptic was required in only one case, No. 15, but 2 mins. (ephedrine and pitressin) brought about an immediate and sustained rise in blood pressure.

In case No. 9 (age 63), perfectly satisfactory anaesthesia, without supplementation, was induced with 12 mg. of hypobaric pontocaine solution. We feel that a close study of this table will reveal the excellent conditions of the patients throughout, as well as at the termination of the operative intervention. Despite the high levels of sensory analgesia in the 38 cases of biliary tract surgery and the 37 cases of gastric surgery, no case of respiratory embarrassment owing to high intercostal paralysis was noted.

In table IV is shown 19 cases of nephrectomy in chronological order. The lateral or modified Jones technic and the warmed 0.1% solution of

Table II—

Cholecystectomies—Etherington-Wilson Technic
Cases aged 45 years and over—In Chronological Order

No.	Age	Dose Mgs.	Time Up. Secs.	Ephedrine Mgs.	Sensory Level	Suppl. NaPent Gms.	Blood Pressure Readings			Intrav. G. & S. CCS.	Pulse		Operative Duration
							Initial	Variations	Final		Initial	Final	
* 1	50	10	30	50	3D	-----	90	90-125	120	-----	80	70	30
† 2	54	16	40	60	3D	-----	95	85-120	90	-----	72	66	50
‡ 3	45	15	30	20	4D	-----	80	65-110	110	-----	74	60	55
4	52	17	35	75	3D	0.87	120	120-150	140	900	72	82	80
5	50	14	35	35	3D	-----	100	100-115	115	-----	68	66	45
† 6	45	18	33	75	2-3D	0.37	105	105-155	155	1000	70	88	105
7	45	17	35	25	2-3D	-----	100	80-100	90	-----	76	60	65
8	50	16	35	50	4D	0.45	100	90-120	120	1000	70	78	70
* 9	63	12	45	50	3D	-----	105	95-105	105	500	78	60	50
10	63	15	35	30	3D	-----	110	90-110	100	-----	74	80	45
* 11	57	15	45	20	3D	0.25	110	110-95	105	250	68	60	55
12	66	14	45	20	3D	0.50	150	100-150	130	1000	78	64	80
13	50	15	35	25	2-3D	0.25	90	90-100	100	500	70	58	75
14	45	15	40	20	3D	0.25	105	85-105	105	-----	70	70	85
† 15	49	18	55	25	1D	0.20	100	50-115	115	-----	74	80	75
16	62	14	35	30	3-4D	0.75	100	100-145	145	1000	68	42	95

*Appendectomy included.

†Exploration common duct.

‡Analeptic—2 minims or mins. "pitressin and ephedrine."

Transfusion whole blood No. 9 and 12.

hypobaric pontocaine were used in each case, and nasal oxygen and an infusion were administered throughout the operative intervention. The amounts of 5 per cent glucose and saline and/or whole blood administered are indicated. Excellent relaxation was present throughout in all cases; thus the only supplemental anaesthetic required was pentothal sodium; in 7 cases it was administered "routinely," and to 3 cases because of pain (1 case of pain on closure of skin, 1 pain due to kidney rest and 1 pain in shoulder referred from diaphragmatic irritation). The average dose of pentothal sodium was approximately 0.5 Gm.

Many of these patients were poor operative risks, e.g., case No. 1, 4, and 13, had preoperative hyperpyrexia because of obstructive pyonephrosis; several patients had a high blood urea, and case No. 2 suffered from a ruptured hydronephrosis. Cases No. 1 and 13 were returned to the ward with clamps on the kidney pedicle.

The optimum position of the patient when inducing hypobaric pontocaine spinal anaesthesia for nephrectomies in average adults is an inclination of 20-30 degrees horizontally (head up). This position is maintained forty to fifty seconds after the beginning of the injection of the anaesthetic solution, and then is quickly converted to a slight lateral Trendelenburg position, which obtains for the remainder of the operation. This table indicates that a considerable difference in segmental sensory anaesthetic levels on the two sides can be obtained with this technic. This obviously increases the safety of the spinal anaesthesia, as there is vasodilatation of a smaller proportion of the vascular bed and consequently a larger proportion is left intact with its inherent ability to

undergo compensatory vasoconstriction to aid in maintaining cardiovascular equilibrium.

Interference with respiration was not apparent in these cases and there was a minimum of motion under anaesthesia, many being able to move a major portion of the joints of the lower extremity and as mentioned previously several were able to move unassisted onto the stretcher.

Table V is a self explanatory summary of the 31 Subtotal Gastrectomies.

Appendectomies—There are 267 appendectomies in this series; 208 patients were anaesthetized with the 0.1 per cent solution (average dose 12 mg.) while 59 were anaesthetized with the 0.075 per cent solution (dose, 10 mg.). The Etherington-Wilson technic, maintaining the up-right position twenty-five to thirty seconds with the warmed 0.1 per cent solution, or thirty-five seconds with the cool solution, has been found to be the method of choice. This results in sensory analgesia from the seventh to fifth dorsal segment in the average size adult.

One patient in this group who sat up after having been placed in the Trendelenburg position developed total sensory analgesia without any untoward effects either during or after the operation. There were no deaths in this group.

The ability to control accurately the resultant levels of spinal anaesthesia is important in lower abdominal and pelvic procedures as well as in high abdominal and chest operations, e.g., transurethral resections. Since analgesia of sufficient duration can be induced with a small dose (8 mg.) and a dilute solution without reaching above the twelfth dorsal segment, the senile, debilitated and arteriosclerotic men requiring this operation

are assured safe, pleasant and relatively non-toxic anaesthesia with a minimum of postoperative discomfort and sequelae. This has been clearly illustrated in our 42 cases of transurethral resection. There was no incidence of marked fall in blood pressure or the appearance of the premonitory signs of shock, although several lost considerable amounts of blood. The only death in this group occurred in case No. 5, age 79. He tolerated the operation and anaesthetic well but developed a severe hemorrhage postoperatively and died before adequate treatment could be instituted. (The postmortem findings included an adherent pericardium with complete obliteration of the pericardial cavity).

Similarly, the ability to control accurately the resultant levels of anaesthesia insures adequate muscular relaxation for herniotomies and genitourinary operations, etc., with minimum incidence of postoperative chest complications. In nearly all cases of haemorrhoidectomies and resections of pilonidal sinuses in this series the level of analgesia was below the fifth lumbar segment.

The ability to control accurately the levels of spinal anaesthesia is particularly important in the older hypertensive group of patients, as one must exercise special care to keep the blood pressure at or near its preanesthetic level (23). There is very rarely a marked fall in blood pressure when minimum doses of hypobaric pontocaine are employed, so the necessity of injecting preoperatively large doses of prophylactic pressor drugs with consequent danger of marked elevation of blood pressure does not arise.

We wish to mention briefly a few interesting minor procedures performed with these more dilute solutions. Several plastic operations such as the raising of skin flaps and tedious tendon transfers have been conducted satisfactorily with spinal analgesia. The patients were able to move the joints and tendons actively when requested to do so, thus aiding the surgeon. Five milligrams of 0.05 per cent hypobaric pontocaine solutions rendered cystoscopy painless when retrograde pyelograms were performed and the patient was able to inform the urologist when tension was felt in the kidney pelvis. This prevents the danger of rupture or over-distention of the pelvis, as may happen under general anaesthesia. The patient is also able to hold his breath when asked to do so during the taking of roentgenograms, which is impossible in a somnolent patient.

A few factors pertinent to these technics are:

(1) **Premedication.** Marked drowsiness and amnesia are necessary for success, and hence we commonly use relatively large doses of morphine,

demerol, scopolamine and nembutal or phenobarbital.

(2) **Timing.** Absolute accuracy is of even greater importance than when employing nupercaine (1:1,500) because hypobaric pontocaine ascends more quickly because of the lower specific gravity. We do not believe that it is safe to lay down formulae for calculating the length of time to keep the patient upright when employing the Etherington-Wilson technic or the length of time to keep the patient inclined when employing the lateral technic, as the rate of ascent varies with the dose, rate of injection and position of the patient. In table III is shown a table of timing and dosage which has been found useful and accurate in our hands. We feel, however, that each anaesthesiologist should develop his own standards.

Table III—

**Average Dosage of Hypobaric Pontocaine
Etherington-Wilson Technic**

Operations	0.1% Solution	
	Dose Mgs.	Time (up)
Splenectomy	14	40
Gastrectomy	18	40-55
Cholecystectomy	15	35-45
Perforated Ulcer	14	35-45
Appendectomy	12	30-40
Pelvic Laparotomy	10-12	20-25
Lateral Technic		
		Time (Lat.)
Nephrectomy	14	30-40 (20-30°)
Thoracoplasty	12-15	60 (30-45°)
Herniotomy	12	30 (3-5°)
Varicocele	12	30 (3-5°)
Haemorrhoidectomy	5	Lat. (Head down)
Pilonidal sinus	6-10	Lat. (Head down)
Lower Extremity	8-10	Lat. (Head down)
*Lower Extremity (T)	12	20-30 (3-5°)
Transurethral Resection ..	5-8	Lat. (Head down)
Prone Technic		
Nucleus Pulposus	14-18	(Head down)
Pilonidal Sinus	5-9	(Head down)

*Tourniquet Applied

Dosage. We have found that smaller doses are necessary for adequate anaesthesia than when pontocaine is employed alone or in conjunction with glucose, and we feel certain that even smaller doses than we have used would be sufficient in many cases because the low minimum effective concentration of pontocaine is being utilized approximately to its full extent, and also better control is exercised over the spread of the anaesthetic solutions within the subarachnoid space. Table III illustrates the average dose commonly employed for the various operative procedures.

The onset of anaesthesia requires only two to three minutes. It probably takes place more quickly than with any other spinal anaesthetic agent; thus the patient is always ready for the

Table IV—

Nephrectomies—Modified Jones Technique (Lateral)
—In Chronological Order—

No.	Age	Dose Mgs.	Time Secs.	Ephedrine Mgs.	Sensory Level Dorsal	Suppl. NaPent Gms.	Blood Pressure Readings			Intrav. 5% G. & S. CCS.	Pulse		Operative Duration
							Initial	Variations	Final		Initial	Final	
*1	50	14	35	50	L.6D R.10D	0.63	115	110-135	135	500	84	90	90
2	27	14	20	50	L.8D R.6D	.....	110	80-110	110	500	90	144	90
3	33	14	20	20	6-D	1.0	140	110-150	145	1000	84	108	135
4	29	16	30	50	4-D	1.0	110	100-130	130	1000	120	108	100
5	26	15	40	60	L.6D R.4D	0.75	95	95-140	120	1000	70	66	90
6	25	14	?	25	5-D	0.5	125	125-110	125	.....	78	78	60
†7	62	16	40	25	6-D	0.63	130	140-0	0	1000	84	.....	.....
8	26	15	45	30	7-D	0.5	110	100-120	110	500	74	60	115
9	60	15	50	50	?	0.35	130	120-150	140	200	82	84	60
10	23	15	45	20	L.6D R.4D	.....	130	105-130	110	1000	80	78	100
11	24	17	45	25	L.7D R.4D	0.5	130	100-130	130	500	70	84	90
12	23	17	45	25	L.4D R.8D	0.5	110	110-135	135	500	96	84	105
*13	53	16	40	25	L.8D R.4D	.....	130	95-140	140	300	96	112	75
14	36	15	60	25	L.5D R.3D	.....	105	105-125	125	450	68	54	70
15	19	16	55	25	L.2D R.4D	.....	110	110-150	120	500	74	60	75
16	55	15	?	25	L.4D R.2D	.....	130	110-160	140	1000	76	60	80
17	38	15	40	25	L.4D R.6D	.....	120	110-135	135	1000	78	84	60
18	67	15	35	30	L.8D R.5D	.....	115	130-100	120	500	74	64	85
19	19	16	?	20	L.4D R.6D	.....	120	120-125	125	500	76	68	60

*"L.F." means Lateral Fowler position 20-45° with the horizontal.

*Returning to ward with clamps on pedicle.

Transfusions given No. 1, 2, 7, 9, 11, 12, 13.

†Death due to hemorrhage after pedicle clamp broke and ligature slipped off pedicle.

Table V—

Sub-total Gastrectomies—Etherington-Wilson Technique
—In Chronological Order—

No.	Age	Dose Mgs.	Time Secs.	Ephedrine Mgs.	Sensory Level	Suppl. NaPent Gms.	Blood Pressure Readings			Intrav. 5% G. & S. CCS.	Pulse		Operative Duration
							Initial	Variations	Final		Initial	Final	
1	52	18	35	50	2-3D	0.12	105	80-125	125	1000	68	60	135
2	65	18	30	50	3D	0.75	135	100-140	125	500	78	60	120
3	29	18	37	50	3D	0.62	110	110-140	130	500	64	104	105
4	66	17	37	75	2-3D	0.25	90	90-120	120	500	68	102	95
5	48	19	40	50	1-2D	0.75	110	75-135	135	1500	72	96	125
6	41	20	40	50	1-2D	0.63	115	105-130	130	250	66	72	110
7	24	18	40	60	2D	1.25	105	95-125	125	1000	60	90	105
8	39	18	40	50	2D	0.5	110	95-145	145	500	68	60	100
9	35	18	45	60	2-3D	0.87	110	105-130	125	1000	72	90	110
10	49	18	50	50	1-2D	1.0	125	125-160	155	1500	68	114	125
11	42	17	45	50	2D	1.0	120	100-125	115	1000	70	72	90
12	46	17	47	50	2-3D	0.83	135	130-150	140	1000	74	80	100
†13	38	16	40	50	4-C	0.12	100	90-100	100	500	78	72	90
14	42	20	55	50	2D	0.5	115	100-140	130	1000	68	60	100
15	60	16	45	60	3D	1.0	110	110-150	150	500	76	84	90
16	44	20	50	50	2D	0.75	110	110-155	145	500	74	78	85
†17	32	17	45	50	2-3D	0.50	115	100-135	135	1000	78	72	85
†18	58	17	45	50	3D	0.67	110	70-120	110	1000	132	132	140
19	49	18	55	50	2D	0.63	105	80-120	120	1000	72	78	85
20	50	18	50	50	2D	0.5	95	85-105	95	1000	66	68	95
*21	52	18	50	50	2D	0.75	110	100-145	135	1000	60	72	145
22	36	18	55	25	2D	0.75	105	90-110	105	500	68	76	85
23	50	18	55	50	2-3D	1.0	120	115-140	140	1000	68	96	100
24	60	17	50	50	2D	0.62	130	110-150	150	1000	70	90	80
25	50	18	50	30	1-2D	0.75	110	100-125	120	700	72	66	95
26	21	20	55	25	1-2D	0.75	100	100-135	135	1000	64	66	95
27	55	17	53	35	1-2D	0.42	100	85-120	120	500	82	90	80
28	24	18	50	25	1D	0.75	115	100-135	135	1000	80	84	100
29	44	20	60	50	2-3D	1.5	90	90-140	140	700	70	96	185
30	47	20	60	25	2D	1.25	110	80-145	145	1300	76	98	155
31	40	20	70	25	1-2D	1.25	110	100-125	125	700	72	100	150

†A very short female-developed total sensory analgesia.

*Analeptic given 1/2 cc. (ephedrin and pitressin) repeated 3 times.

†Practically a total gastrectomy for a very high carcinoma.

All received 500cc. whole blood except Nos. 5, 9, 10, 13 and 20.

initial incision as soon as painting and draping have been completed.

Duration of Anaesthesia

The duration of anaesthesia naturally varies with the dose and type of operation. We have found that 16 to 18 mg. is sufficient for major abdominal or chest procedures requiring two to two and one-half hours of operating time. Twelve to 15 mg. is sufficient for major abdominal procedures requiring one and one-half to two and one-quarter hours and 5 to 7 mg. is sufficient for transurethral resections requiring over one and one-half hours of operating time. The duration of analgesia is greater than that of motor anaesthesia, e.g., 12-15 mg. is sufficient for exploration for extruded nucleus pulposus requiring over three hours of operating time, and 6 to 8 mg. is sufficient for excision of pilonidal sinuses requiring an hour of operating time.

Complications

There have been no severe postoperative neurologic sequelae. Some patients developed low-grade headaches and in all but two they cleared up within ten days. In these latter 2 the headaches were of low-grade character and continued approximately fourteen days. Headaches were most prevalent following haemorrhoidectomies; thus we feel that they are largely gastro-intestinal in origin. Major respiratory complications such as lobar and lobular atelectasis or bronchopneumonia developed in approximately 1 per cent of cases. A majority of these occurred during waves of upper respiratory infection and in patients who had operative wounds which limited respiratory excursions. These complications all cleared up on medical treatment and/or bronchoscopy. In approximately 2 per cent minor respiratory complications developed, all of which cleared up following routine medical therapy.

Advantages

(1) The ability to maintain the Trendelenburg or lateral Trendelenburg position throughout the operation aids in the prevention of shock and cerebral anoxia; if these should intervene this position aids in their treatment. This position is ideal for administering a general or intravenous supplementary anaesthetic agent should one become necessary.

(2) The onset of anaesthesia is probably more rapid than with other spinal anaesthetic agents.

(3) The lateral technic is time-saving and less manipulation of the patient is required than with the Howard Jones technic.

(4) The duration of anaesthesia is sufficient for a majority of major operations and for nearly all minor surgical procedures. In a great number

of cases the longer-acting spinal anaesthetic agents, such as nupercaine, produces surgical anaesthesia with a resultant depression of vital function and processes over a period much longer than required for the operative procedure, with consequent increased morbidity and probably also increased mortality rates.

(5) Sensory analgesia extends two to four segments higher than the motor block, which greatly decreases the risk in high spinal anaesthesia; also there is less interference with respiratory excursions than with comparable levels of anaesthesia induced by other agents.

(6) Hypobaric pontocaine possesses physical properties which enable accurate control of its spread within the subarachnoid space. This decreases the risk in high spinal anaesthesia and assures maximum duration of anaesthesia with minimum dose.

(7) An optimal dose of one of the dilute solutions of hypobaric pontocaine, in practically each instance, induces maximal sensory analgesia, sufficient muscular relaxation for the proposed operative procedure, with apparently a minimal blocking of the sympathetic ganglia. This insures minimal interference with vital processes, favors minimal depression and accounts for decreased postoperative discomfort and sequelae, and decreases the incidence of reactions and toxicity. In addition, it increases the scope of spinal anaesthesia by making possible its administration with relative safety, to patients suffering from cardiovascular, respiratory or other systemic condition, who otherwise would be denied the benefits of this form of anaesthesia.

We have attempted to present a number of standard technics for utilizing a new spinal anaesthetic agent, hypobaric pontocaine, which will fit that mythical person, the average adult, and which should serve as a base from which excursions can be made in either direction, making the necessary variations in individual patients for factors such as age, general condition, operative time and physical characteristics.

Footnote

Our series of hypobaric pontocaine spinal anaesthesia now exceeds 3,500 consecutive cases. Two subtotal gastrectomies and several other major abdominal procedures have been conducted with continuous spinal anaesthesia (catheter technic) using 0.1 per cent hypobaric pontocaine as the spinal anaesthetic agent.

In over 500 cases adrenalin 1:10,000 to 1:20,000 has been added to the 0.1 per cent and 0.075 per cent hypobaric pontocaine solutions. This has prolonged the effective duration of the spinal anaesthesia at least 30-50 per cent and reduced the

dose of pontocaine solution necessary. For example in Nucleus pulposus, the last 20 cases of this condition have each been satisfactorily anaesthetized with 10 mg. of the 0.1 per cent hypobaric pontocaine solution containing 1 in 10,000 adrenalin. One case (exploration of 3 intervertebral spaces) required $3\frac{1}{2}$ hours of operating time but no supplemental anaesthesia was required. Postoperatively these cases had sensory analgesia 4 hours or longer after the induction of anaesthesia. Similar results were obtained in other operative

procedures.

We have seen no ill effects resulting from this technic other than an increase in the incidence of nausea on the operating table rather than post-operatively.

Further investigation is being undertaken to determine the optimum concentration of adrenalin or other vaso-pressor agent, required to induce satisfactory anaesthesia with a minimum dose of hypobaric pontocaine solution.

P. C. L.

OPHTHALMOLOGY

The Binocular Reflexes in Ophthalmology

Robert M. Ramsay, M.D., M.S.

This paper is written in an endeavor to present to the paediatrician a resume of the more commonly accepted principles concerned in the development of binocular reflexes.

The subject is divided into five parts:

- A. The normal development of the Binocular Reflexes:
 - I. Anatomical.
 - II. Physiological.
- B. The Abnormal development of the Binocular Reflexes.
- C. Classifications of Heterophoria and Heterotropia.
- D. Diagnosis of Heterotropia.
- E. Therapy of Heterotropia.

A. The normal development of the Binocular Reflexes.

I. Anatomical development (Chavasse):

At birth the normal eye is only partially developed. The orbital axes are at 50 degrees, as compared with the adult 45 degrees. The extraocular muscles are well developed but the ciliary muscle is poorly developed and the eye shows several dioptres of hypermetropia. The macular foveae are inadequately developed and hence fixation may be faulty. The corneal diameters and antero-posterior diameter of the eyeball are roughly 75% of the adult value. The angle gamma is about twice the adult value.

At slightly over four months the foveae become fully differentiated and the corneal diameters approach normal size at two to three years of age. By the time the child is eight years old the globe has reached almost adult size and hypermetropia has diminished to the average of one dioptre.

II. Physiological Development:

This takes place along with the anatomical development. Under normal conditions the child's

visual acuity increases with the development of the foveae and the brain.

In addition the ocular sensations are correlated with auditory, tactile, vestibular, postural sense and other orientational sensations, until the intricate reflex pattern of the adult is achieved.

The two uniocular sensations are elaborated independently and contemporaneously to reach a stage of sensory completeness. As the two uniocular sensations are slightly dissimilar, a single binocular perception is created intermediate between the two sensations and is projected into space as though the individual possessed a single cyclopean eye.

Chavasse states that these binocular reflexes are refined at the age of two years and fixed at the age of five years.

The normal child at the age of eight years therefore has the following characteristics in regard to visual development:

1. The eyes are anatomically approximate to adult development.
2. Visual acuity is normal in each eye.
3. Binocular vision with stereopsis is present.
4. Ocular orientation is fully integrated with the other orientational reflexes.
5. The refractive error is about one dioptre of hypermetropia.

B. Abnormal development of the Binocular Reflexes.

The normal development of the binocular reflexes is subject to a multitude of hazards. Heredity plays an important role and is very frequently a dominant cause of heterophoria. It may act in many ways: from the absence of some anatomical structure to a failure in physiological development. Developmental defects without an hereditary basis may cause defects in the brain, skull, ocular muscles and nerves, and eyeballs with resultant abnormal binocular reflexes. The trauma of birth may affect one or more of these structures. Illnesses, if in early childhood, make

their contribution to the etiology and it is commonplace to hear a parent state that strabismus followed measles or mumps or high fever. It is generally felt that the exanthemata may play an activating role in the production of squint, and that other causative factors play a dominant role. Psychogenic factors may play a role in the production of squint where the child craves attention.

C. Classifications of Heterophoria.

Strabismus may be primarily divided into paralytic and non-paralytic or concomitant types. From this point only the non-paralytic or concomitant type is under discussion. This rules out the gross developmental abnormalities and lays stress upon abnormal physiological development.

When binocular reflexes are undeveloped or abnormal the condition is often manifested by strabismus. Orthophoria is the term used to indicate normal alignment of the visual axes, while heterophoria indicates an abnormal alignment of the visual axes.

Heterophoria indicates a tendency towards faulty alignment while heterotropia indicates a manifest deviation of the visual axes. These terms are further sub-divided thus:

Heterophoria or Heterotropia

1. Esophoria(tropia)—the deviating eye turns in.
2. Hyperphoria(tropia)—the deviating eye turns up.
3. Exophoria(tropia)—the deviating eye turns out.
4. Cyclophoria(tropia) — the deviating eye undergoes rotation on the anterior-posterior axes.

Esotropia

Is the most common form of strabismus met with. Usually the history indicates an hereditary factor and refraction shows an ametropia, which is usually hyperopic in nature. Where the eyes became "straight" when wearing suitable spectacles or while under the influence of a cycloplegiac, the condition is regarded as Accommodative in nature. When one eye constantly is IN the condition is called Monocular Esotropia and the squinting eye is usually more ametropic than its fellow in addition to being more or less amblyopic. At other times the eyes alternate in deviation and such eyes usually have an equal ametropia and visual acuity. This form of squint is called Alternating Esotropia.

Exotropia

Is much less common than esotropia. Monocular exotropia may be accompanied by intense amblyopia with high ametropia of the deviating eye. The ametropia is likely to be myopic in nature.

Alternating Exotropia is more common than the monocular variety and in these cases the visual acuity and ametropia are similar in the two eyes. The refractive error is likely to be myopic.

Hypertropia

Is much more common than is usually thought. It is also often associated with esotropia and some cyclophoria is almost invariably present. Hypertropia may be Alternating or Monocular in type.

D. Diagnosis of Heterotropia.

The diagnosis of heterotropia is easily made by keen observation. From the time of birth a child will "fix" a light and the resulting corneal reflexes will indicate the presence or absence of a manifest deviation. When the child is older the cover test will enable one to pick up even slight degrees of heterophoria.

It is essential to keep in mind two common errors in assessing the parallelism of the visual axes. When the subject is six months of age or less the weak ciliary muscle combined with the inadequate development of the foveae may give rise to ocular deviations which are purely transitory and are not indicative of strabismus. The presence of epicanthus often causes a simulated esotropia especially in laevoversion or dextroversion.

However, close attention to the corneal reflexes in younger subjects, and the cover test in older subjects will prevent such errors.

At this time it is opportune to point out that the large angle gamma must be considered when assessing the corneal reflexes. This angle is almost always positive and when large, simulates a divergent anomaly. However, in older subjects the cover test will differentiate the pseudo and actual divergence nicely.

The cover test is most useful and can be demonstrated much better than it can be explained. To anyone not familiar with the test it is suggested that a demonstration be arranged with an oculist colleague.

E. Therapy of Heterotropia.

Where manifest strabismus exists in a child two to four years of age only two measures are possible. Firstly, a cycloplegic refraction should be done and suitable spectacles prescribed where ametropia exists. Secondly, where one eye is predominantly deviated, the fixing eye should be suppressed by occlusion or the instillation of atropine, to stimulate the development of vision in the squinting eye.

When the subject is four to six years of age the estimation of visual acuity is possible and occlusion of the better eye should be carried out constantly until the vision of the deviating eye

approaches equality with the fixing eye. When the vision of the deviating eye is 20/60 or better, orthoptic exercises may be commenced with a view to stimulating fusion in suitable cases.

Frequent examination is necessary during the first six years of life because the binocular reflexes are developed in these years, and it is at this time that therapy is most effective.

In certain cases where the anatomical deviation is excessive, surgical measures will be necessary and the appropriate time for surgery depends upon assessment of all the factors in each individual case. However, surgery merely "straightens" the eyes and the important thing is to develop normal vision in both eyes.

With refraction, occlusion, orthoptics, and surgery combined, it is possible to eventuate a perfect result, which consists of:

1. Normal vision in each eye.
2. Binocular vision with stereopsis.
3. Orthophoria.

In terminating this paper I would like to make one plea. Do not tell the parents "not to worry because the patient will probably grow out of the squint." This faulty advice has resulted in many persons being relatively blind in one eye with or without a squint. Remember that even without the presence of a squint it is possible for amblyopia exanopsia to develop. Keep an illiterate Snellen chart handy and make it a routine to record the visual acuity of each and every paediatric patient of four years of age and over.

Summary

The normal development of the binocular reflexes has been indicated. The abnormal development and sequelae have been discussed. Method of therapy has been outlined with emphasis on the development of vision in both eyes.

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TUBERCULOSIS

From 1930 to 1945, the tuberculosis death rate in Manitoba has been reduced from sixty-one per hundred thousand to forty-five per hundred thousand population, a reduction of thirty-one per cent. For White people alone the death rate during the same period has been reduced from fifty-five to twenty-five per hundred thousand which is a reduction of fifty-four per cent during the last fifteen years. In 1931, 322 White people died of tuberculosis in Manitoba and in 1946, 196. Although this is very gratifying, the impression I wish to leave is that we are still a long way from our ultimate goal and intensified effort and expenditure needs to be continued. In 1938 in an address I stated, "The very nature of tuberculosis is such that it cannot be conquered in one generation but if the same progress continues in the next fifty years, as in the past fifty years, it should be reduced to a minor place as a cause of death with a corresponding alleviation of economic and domestic distress that follow in its wake."

Tuberculosis is under the most severe attack ever directed at it. In Manitoba there are 750 sanatorium beds for White people and 350 for Indians, making a total of eleven hundred beds for tuberculosis in the Province. The Sanatorium Board operates the Manitoba Sanatorium at Ninette with 280 beds, the Central Tuberculosis Clinic in Winnipeg as a diagnostic centre and with fifty beds for treatment and conducts surveys and travelling clinics throughout the Province. The Board also operates Indian hospitals at The Pas,

Dynevor and at Brandon. The Sisters operate St. Boniface Sanatorium with 275 beds and the City of Winnipeg, the King Edward Hospital with 140 beds. At the present time there are more people on treatment for tuberculosis in Manitoba than ever before and in spite of this there are waiting lists for each sanatorium. In fact, at the present time there are over fifty in their homes many of whom are infective, who have been found with active tuberculosis since the first of January. The sanatoria can only accept new patients as other patients are discharged and although every effort is made to discharge patients as early as possible the demand for treatment beds exceeds the supply.

For many years there have been tuberculosis travelling clinics visiting centres once or twice a year throughout the Province. More frequent clinics of this type are now in operation and they are a highly effective means of case finding but necessarily limited to certain higher incidence groups, such as contacts. A few years ago changes in x-ray equipment enabling the use of miniature film made possible financially and technically, the mass x-raying of everyone in a community. Last year 117,000 were x-rayed on surveys and travelling clinics and by this means 400 new cases of tuberculosis were discovered and altogether during the year, there were over 1,000 new cases in Manitoba. By these surveys one in 2,000 x-rayed is found to have active tuberculosis and about one in 400 with some evidence of previous tuberculosis infection. This year we have been in touch with every

municipal council where there has not been a survey and we plan on completing the x-raying of all rural Manitoba in 1947, comprising over seventy municipalities and a population of about 240,000. We have two large mobile units constantly x-raying 7,000 to 8,000 people a week and so far this year have x-rayed over 100,000.

The aggressive case-finding program of the last few years in particular, has created a demand for more beds and through surveys and their educational effect the public is much more tuberculosis-conscious, is more willing to accept and indeed demand treatment. New discoveries will continue to increase with more intensive searching and treatment facilities must keep pace and increasing treatment costs anticipated. Since there is no specific curative drug or medicine for tuberculosis it appears that ultimate clearing of the disease can only be attained by preventing new cases which means preventing people from becoming infected by the discovery of new cases before infection has been spread to others. A few years neglected tuberculosis would lead to ever increasing circles of infection and multiplication of new cases that would soon gain such momentum that many added years and a tremendous expenditure of money would be necessary to regain control. A characteristic of tuberculosis which makes it difficult to control, is its chronicity and tendency to relapse and even with disease arrested and a person well, there may be periods when he may be infective. The infectious disease tuberculosis is treacherous and insidious in its manifestation and becomes unsuspectingly entrenched before symptoms develop and may even reach a chronic infectious stage without illness. This is why its eradication is prolonged and why tuberculosis is still a major menace to life, health and happiness and worst of all, takes its greatest toll during life's best and most productive age period. Tuberculosis causes more loss of life-years than any other disease.

Our present day emphasis on case-finding and prevention may tend to over shadow the important role of sanatorium treatment which has made striking progress in the past twenty years. The much improved outlook for the average sanatorium patient is mainly due not only to earlier diagnosis but to more aggressive application of the old principle of rest directly to the lung by

surgical procedures. Treatment and isolation which saves the life of the afflicted and saves the lives of others in the family and community must proceed abreast with the discovery of new cases. There was much more tuberculosis twenty years ago than now and most people drifted into an advanced stage of the disease before it was discovered. We are aware of more new cases now simply because we are searching for them.

Tuberculosis among Indians is a major problem in Manitoba. However, I am very glad to be able to report quite definite progress during the past few years in this respect. The Sanatorium Board is operating for the Department of Indian Affairs, an 80-bed sanatorium near The Pas and this will be increased to 150 beds within the next year. Fifty Indians are on treatment at Dynevor Hospital, Selkirk, and the Sanatorium Board has taken over at Brandon a 200-bed veterans' hospital for Indians. At the present time we are conducting surveys among the Indians in Northern Manitoba and in Southern Manitoba we are in the midst of surveying 5,000 Indians on Reserves. Although there are many factors among the Indians making tuberculosis control difficult, of most importance is getting the active and infective cases out of homes and away from their families.

I would like to draw your attention to the fact that the surveys, the travelling clinics and the whole case-finding program, and also our Rehabilitation work which I will not take time to discuss are financed by voluntary sums, that is money obtained through the sale of Christmas Seals and during the past two years by the remarkable contribution of the Associated Canadian Travellers by funds raised through amateur concerts held in towns throughout Manitoba. It was money raised by the Travellers that made possible the purchase of the two completely equipped mobile x-ray units.

The anti-tuberculosis program is now in high. Application of brakes would soon result in losing much that has been gained. A large investment has been made in tuberculosis. We cannot stop, we should not even slow down but must forge ahead to gain the objective of clearing tuberculosis from our homes, our communities and our Province.

E. L. Ross, M.D.,

Medical Director, Sanatorium Board of Manitoba

CARDIOLOGY

On Toxic Doses of Digitalis

L. R. Coke, M.D.

William Withering tried to cure hydrocephalus with digitalis, but in this and other therapeutic trials he did not exceed his customary doses. It was left to his enthusiastic colleagues to poison patients with the drug whose benefits he had described.

Withering said, "The more we multiply the forms of any medicine the longer we shall be in determining the real dose. . . . Foxglove when given in very large and rapidly repeated doses occasion sickness, vomiting, purging, giddiness, confused vision, objects appearing green or yellow, increased secretion of urine with frequent motions to part with it, and sometimes inability to retain it; slow pulse, even as slow as thirty-five per minute, cold sweats, convulsions, syncope, death. . . ."

The multiplicity of forms of digitalis has increased. Our knowledge about digitalis is still imperfect.

Case I. J. L. was seventy-two years old. He had attended the clinic for a long time and had been on digitalis. In August, 1946, he was admitted to hospital with a diagnosis of myocardial infarction and he had the usual period of rest in bed. On discharge he was given some white pills and told to take one daily. At home he resumed the use of the green digitalis to which he was accustomed. October 21st, after three weeks on this regime, he reported to the O.P.D. feeling very weak, with breathlessness, vomiting and yellow vision. He was cyanosed. His pulse was 104 and his weight was 240 pounds. Digitalis and Purodigin (the white pills) were stopped. He was given ammonium chloride and salyrgan. His weight fell from 240 to 205 and his pulse from 104 to 80.

Case II. C. W., aged 75, was admitted to hospital July 1, 1946, too drowsy to give a history. He could be partly roused, but would not eat and he was disoriented. His pulse was 42 and irregular. E.C.G., in addition to the rate and rhythm changes showed frequent ventricular ectopic beats and depressed S-T segments. There were no signs of heart failure.

When he recovered he related that he had been examined by a cardiologist, who left Winnipeg for the south several years ago, and had been advised to take a grain and a half of digitalis leaf per day. He had done this ever since. His health had failed gradually.

He is now on a grain of digitalis leaf per day. His appetite is good. His pulse is 70.

Case III. D. G., aged 15, was examined in hospital June 26, 1946. He was propped up in bed, blue and breathless, vomiting and lethargic. The abdomen was protuberant and there was oedema of the legs. He had murmurs of mitral and aortic valvular disease and crepitations in the lung bases. His apical rate was 120 and the rhythm was irregular.

He had been admitted to the hospital three weeks before. He received fifty minims of tincture of digitalis, daily, for three days and thirty minims daily for twelve more. He was nauseated at this time and was changed over to Purodigin, of which he received 0.6 milligrams daily for six days. After all this digitalis his heart failure was still apparent. A favourable response was obtained with salt restriction and salyrgan and he improved sufficiently to go home. I estimated his digitalis dose as four and a half times the necessary dose for a good clinical effect.

Case IV. Miss M., aged 63, was admitted to hospital in January, 1946, with acute congestive failure. The electrocardiogram showed auricular fibrillation with a ventricular rate of 220. Her weight was 245. The thyroid was enlarged and there was an asymmetrical exophthalmos. She was given thiouracil 0.1 grams three times daily and Digitaline Nativelle 0.2 milligram twice daily. After fourteen days on this regime and two injections of salyrgan her weight came down to 196 pounds, her pulse was irregular at 88 and the B.M.R. had dropped from 60 to plus 20. She was drowsy, and though fairly well oriented, heard insistent voices that said rude things about her doctors. E.C.G. showed sagging S-T segments and frequent ventricular ectopic beats. Digitaline was stopped and she improved sufficiently to have her operation.

Case V. W. B., aged 56, was examined at home on December 14th, 1946. He complained of nausea, vomiting, sleeplessness and pressing retrosternal pain. He said that he was kept awake by hearing loud conversations carried on by the voices of some of his friends, whom he realized were not present. His pulse was 44 and irregular. There were no signs of heart failure. For two months before examination his health had been poor and he had been advised to carry some digitalis tablets about in his pocket and take one or two whenever he felt tired. He had been taking about six grains a day.

Electrocardiograph showed a recent anterior infarct, with slow fibrillation and some ventricular ectopic beats. He was admitted to hospital.

He improved gradually, but as the digitalis effects diminished he became breathless and developed crepitations at the lung bases and enlargement of the liver. He has carried on since with Digitaline Nativelle 0.1 milligrams daily, a salt poor diet and a weekly injection of salyrgan.

Case I took digitalis leaf and Purodigin concurrently. In spite of large amounts of digitalis his pulse remained fast until he lost his odema.

Case II, with increasing age, loss of weight, diminished activity and lack of supervision went slowly into a toxic state.

Case II would probably have lost some of his digitalis through vomiting or diarrhoea if he had not been changed from the leaf to the less irritating glucoside.

Case IV became toxic when her hyperthyroidism subsided.

Case V developed an infarct during the period of digitalis intoxication.

Cases I, III and IV are dead. In each instance several months elapsed between the time of excessive digitalis intake and death and no definite conclusions could be drawn from P.M. findings.

Discussion

In the conservative practise of cardiology the initial requirement of digitalis for a young adult is 1.5 grams of digitalis leaf or (just less than one thousandth part) 1.2 mg. of the glucosides. The maintenance dose is 0.1 grams of leaf or 0.1 milligrams of the glucosides daily.

Failure that does not respond to this amount of digitalis requires the use of complementary methods of treatment.

The dangers of digitalis overdosage have been well known since 1885 when Withering¹ described them. Digitalis has found a place in Forensic Medicine along with other poisons and the manner of dying is carefully described for its medicolegal importance².

It is established that digitalis is unusually dangerous in the elderly, the hyperthyroid and those with coronary artery disease.

With the increasing use of the digitalis glucosides the effects of digitalis on the central nervous system have become of greater clinical importance. First described by Withering, the effects of digitalis on the brain were discussed by Mackenzie³ and Plummer⁴ and careful experimental work has been done by Dearing, Barnes, Kernohan and Essex⁵ and confirmed by Heuper and Ichniowsky⁶. The latter investigators found, "Capillary engorgement and pericapillary oedema. . . .The parenchymatous lesions were represented by foci of vacuolated and disintegrating ganglion cells and glia cell proliferation."

The changes found by the pathologists are similar to those produced by anoxaemia. Clinically there is drowsiness, xanthopsia, auditory and visual hallucinations and other manifestations of confusion.

Dearing, Barnes and Essex studied the effects of large doses of digitalis on the heart muscle⁷. In experiments on cats it was seen that digitalis may cause myocardial damage with fragmentation, vacuolation of fibres and pericapillary haemorrhages. The changes were seen more in old cats than in young ones and more in hyperthyroid cats than in the others.

Dearing, Herrick, Essex and Barnes⁸ also showed that toxic doses of digitalis reduced the coronary circulation in dogs.

Macht, of Baltimore, first reported an increased coagulability of the blood as a result of digitalis⁹. His work has been confirmed by Werch¹⁰, Massie¹¹ and de Takats¹². These and other writers agree that digitalis increases the coagulability of blood in vitro and in vivo. Katz summarised the present concept by saying, "Care must be used in the administration of digitalis in conditions in which there is evidence of thrombosis."

Many treatments for digitalis poisoning have been considered. Atropine, potassium iodide and the anticoagulant drugs may be used if there are no other contraindications. Dicoumarol was used in Case 5.

Summary

Five cases of digitalis overdosage are described and some important contributions to the literature on this subject are summarized.

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OBSTETRICS

An Obstetric Tragedy

Ross Mitchell, M. D.

Before me lies a fine specimen of the book-maker's art. It is bound in full calf with gilt tooling on the back and edges, the paper is good, the type clear, the engravings on copper are exquisite. It was published with the authority of the king, Louis XV of France, at a time when kings were absolute monarchs. It is the sixth edition of Mauriceau's "Treatise on the Diseases of Pregnant and Parturient Women," printed at Paris in 1721. The first edition came out in 1668, the sixth appeared fifty-three years later and twelve years after the death of the author, in itself a proof that the book had become a classic.

Francois Mauriceau received his medical education at the Hotel-Dieu, the great hospital of Paris, then practised with great success at the French capital. He was noted for his bold innovations, among them the practice of delivering his patients in bed instead of in the old obstetrical chair. His book became a canon of the art of obstetrics in its time. It was translated into English in 1672 by Hugh Chamberlen, a member of the Huguenot family which for almost two hundred years preserved the secret of the obstetrical forceps. Hugh Chamberlen offered to sell the secret to Mauriceau for 10,000 livres, claiming that by means of it he could deliver within a few minutes even the most difficult cases of childbirth. Mauriceau, who must have been an ancestor of the man from Missouri, demanded proof and furnished a rachitic dwarf in labour. In a locked room Chamberlen attempted to deliver her and on his failure Mauriceau refused to purchase.

This by way of preface; here is the story as Mauriceau tells it in his book.

"I shall relate an incident which is very noteworthy and the recollection of which is so painful to me that the ink with which I now write to inform the public so that they may profit from it seems to be blood; since on this pitiable and fatal occasion I saw ebbing away before me a part of myself, or rather all that was like myself."

"It was nearly twenty-nine years ago that my sister, not yet twenty-one years old, being pregnant eight and a half months with her fifth child, and feeling extremely well till then, was so unfortunate as to injure herself (though apparently slightly at that time) by falling on her knees so that her abdomen struck the ground lightly. After this she stayed a day or two without much inconvenience, so that she neglected the rest so necessary to her; but the third day of her injury at

eleven o'clock in the morning she was overtaken with strong and frequent abdominal pains accompanied with a great loss of blood. This made it necessary to send hastily for the midwife who did not understand her trade as well as she might, for having come she said to be patient, that the womb would dilate with the pains, assuring her moreover that there was nothing to fear, that she would soon be delivered from this mishap, also that the child was coming well. For three or four hours she thus made her vainly hope until the flow of blood continuing always strongly, the pains began to cease and the poor woman had swooned several times; after which the midwife asked for a surgeon to save her. A messenger came at once to inform me, but unfortunately I was not at home, he then sought out one reported to be the most skilful of surgeons practising midwifery at Paris. He was immediately brought to my sister's dwelling, where he arrived at four in the afternoon; but having seen her in that condition, he contented himself only with saying that she was a dead woman, for whom nothing could be done but administer the last rites, and that she could not possibly be delivered. The midwife concurred, thinking that the opinion of a man so authentically esteemed was beyond question. When he had made this prognosis he returned home at once without wishing to remain longer, and left in this deplorable state and without any help this woman whose life he could have undoubtedly saved if she had been delivered at that time, as was easy enough, as one may well know from the ending of this story.

"After the judgment of a man of so great reputation together with that of this midwife everyone present believed that since Mr. X could do nothing there was no other remedy for so great an ill than to hope in God who can do all things. They sought to console as well as possible my poor sister who aspired with great desire to see me to know if I should pronounce the same opinion and if her ailment was without any remedy, for her blood was flowing continually in great abundance. At last I returned home where someone had come to tell me this bad news, on receipt of which I hastened to her; where I saw so pitiable a sight that all the passions of my soul were aroused. After gaining possession of myself I approached my sister's bed where she had just received the last Sacrament. She adjured me several times to give her the help which she could hope for only from me. After I had learned from the midwife all that had passed and after she had told me the opinion of the surgeon who had

seen her more than two hours before, for by that time it was quite six o'clock, I noticed that the blood continued to flow freely. She had already lost more than three-quarters of her blood, and, in the two hours since the surgeon had been there, more than 48 ounces, to judge from the quantity of the napkins and other cloths which were quite soaked with it, and this blood, remaining in her body, if she had been delivered then, would have saved her life. I saw also that she was seized with fainting fits which grew more severe. This made me realize that she was in much greater peril than if she had been delivered two or three hours earlier when it was possible and easy. I felt the cervix uteri dilated so that I could easily introduce two or three fingers. I made the mid-wife re-examine her to know if the orifice was in the same state when the surgeon examined the patient. She said it was and that it had always been so since he left. As soon as she said this I realized both the ignorance and the bad policy of the surgeon. I would have acted at that moment if I had been able to force my mind to do so; I wavered a long time over the resolution of the difficulty having lost hope of any assistance.

"What restrained me was not the prognosis which this famous surgeon had made nor the little strength which the patient then had, but the fact that it was my sister whom I loved very dearly and that my soul was so shaken with differing feelings on seeing her about to expire before me that I could not make up my mind. This obliged me to send forthwith for the surgeon begging him to return in order that my testimony to the ease of the operation and making him understand that there was never hope if it is not done as soon as possible might persuade him to deliver her in place of abandoning the mother and letting her child perish with her without being baptized for the art (of medicine) requires that not being able to save both, one seeks at least to save the child if it is possible, without prejudicing the mother. But he would not return for any prayers or solicitation, always excusing himself by saying that it was not possible to do anything on that occasion. When I was told that, I sent again for another surgeon among my confreres with whom I should have consulted as to the necessity and possibility of the operation. But fate willed that he was not at home.

"During all these comings and goings another hour and a half passed during which the blood flowed without stopping and the swoonings continued. It was then that seeing myself without hope of having the persons whom I had sought, I resolved to deliver her at once, which was in truth a little late for the mother. For if I had summoned up my resolution to act as soon as I

arrived there was still good hope of saving her as well as her child—which I did in this manner. Having placed two of my fingers in the cervix, I introduced then a third finger and little by little the ends of the five fingers of the right hand with which I dilated sufficiently to give passage to the whole hand. This is easily done on such occasions because the abundance of blood moistens and softens the whole uterus remarkably. I recognized that the child presented by the head and that the waters were not drained away, which made it necessary for me to break the membranes with the tips of my fingers. This being done, I immediately turned the child to take him by the feet with which I pulled him very easily in the manner which I shall teach in the thirteenth chapter of the second book. This I did in less time than it takes to count from one to one hundred; and I protest on my conscience never in my life to have made a delivery (in preternatural cases) more promptly, more easily and with less pain to the mother, who during the operation made not the slightest complaint, although she had possession of her faculties and full knowledge of what I was doing for her. She felt relieved at once as soon as I had thus delivered the baby and placenta after which the blood began to cease. As to the child I drew him out living and he was at once baptised by a Priest who was in the room.

"The operation was still done soon enough to procure Baptism for the child, who received it, thanks to God, as I have just said, but too late to save the mother's life who, having lost earlier all her blood, died an hour after being thus delivered. The loss of blood ceased indeed, but there did not remain enough of it to enable her to resist the syncope."

Mauriceau then considers the motives of the surgeon who refused assistance. Was it through ignorance, ill-will or policy? He concludes that it was the latter, since the surgeon's reputation was already established, and since among the spectators in the sick room he had recognized a lady of distinction, wife of one of the first Captains of the Guards whom he was accustomed to deliver, and foreseeing that the outcome of the operation would be very doubtful, he preferred to retain the esteem of this lady rather than to do his Christian duty.

"I have desired," Mauriceau concludes, "to relate all the circumstances of this gory death in order that the necessity of operating promptly in such a case may be more readily made known. Although this history may be a little long, it will nevertheless appear short if set beside the usefulness of the lesson that may be derived from it. I have found myself on more than two hundred

other occasions of like sort since that time in which, with God's help, I have saved from death the majority of the women and enabled their children to receive Baptism. From this I have had more inward satisfaction than I should have received from any worldly honour which a pernicious policy of self-seeking could have procured.

Such a policy will never be followed by surgeons and midwives whose conscience is well regulated.

It is seldom that a textbook contains an account of such stark tragedy and unsparing judgment. Even the passage of twenty-nine years since the event had failed to remove from Mauriceau's mind the rankling memory of his young sister's death.

MEDICINE

Review of Burn Cases in St. Boniface Hospital, 1943-1946

S. A. Orchard, M.D.

Resident in Surgery, St. Boniface Hospital

When the National Research Council of Canada undertook research in the problems of burns, a section on burns was established in Winnipeg, with Dr. O. S. Waugh as chairman. Early in 1943 Dr. A. C. Abbott, member of the local committee, was instrumental in organizing a Burn Service at St. Boniface Hospital. The purpose of the Service was to standardize the treatment of burns, and to assess the newer methods of burns management. By an energetic series of educational programmes a fairly quick and satisfactory swing-over from the many types of burn treatment on the part of private practitioners in the hospital was made. It should be borne in mind that this review of burn cases will include the work of forty-one different private practitioners, and at least enough individual variations will be found to allow for some interesting and informative comparisons. Also included in this review will be a number of cases treated by tanning agents, taken mainly from the earlier cases of the series.

The purpose of this paper is to review all burn cases admitted to St. Boniface during the four-year period of 1943 to 1946. Either from personal observations, or from the attendants' records, an attempt will be made to arrive at certain conclusions and impressions from the study of the cases.

In the four-year period there were 162 burn cases admitted to hospital. Total hospital days numbered 3,267, with an average hospitalization of 20.16 days per patient. In 1943 this average was 23.39 days, in 1946 18.21 days. Fourteen patients died as a result of burns. Of the 162 cases, 105 were adults (16 years and over), 45 were infants (5 years and under), and only 12 were children (6 to 15 years), thus demonstrating that the industrial and responsible age group, together with the helpless (infant) age group, are most susceptible to the hazards of burns. As can be

imagined, the majority, 86 cases, occurred as the result of accidents arising in the home; 49 resulted from industrial accidents; 13 from farms, and in 14 cases causes were not listed. Of the farm accidents, it is informative that practically half resulted from a common type of accident—that of tractor radiator caps being dislodged, erupting steam and scalding water over the victims.

A brief resume of our methods of treatment will be given to indicate trends and adaptations in management of burns. The initial problem in establishing a Burn Service was to have a suitable centralized burn centre, where adequate supplies were stored and trained personnel was on hand to handle burn cases quickly and efficiently. The Central Service division of the hospital was the logical choice of the Burn Centre. Our initial management was based on the precept that "burns are open wounds" and should be rendered aseptic by sterile techniques. (This "open wound" precept should be revised when it is borne in mind that the wound of a burn is different from an ordinary soft tissue wound. The initial contamination is slight, and it is rare that subcutaneous tissue and muscles are exposed. The skin in dermal, that is, second degree, burns is resistant against infection and organisms die out if healing is satisfactory, though in deep burns, that is, third degree, infection is serious and usual). After shock was satisfactorily dealt with, a double technique of washing and debridement was carried out under operating room conditions. Sulphathiazole impregnated gauze was then liberally applied, over which thick layers of resilient absorbent cotton of mechanic's waste was placed and all was incorporated in a firm, even pressure bandage. Double technique handlings subsequently gave way to single, less meticulous, but still aseptic, technique, and sulphathiazole emulsion to vaseline gauze pressure bandage. With the less radical cleansing, and without local chemotherapeutic applications, we have noticed no increase in the infection rate. The initial dressings are now left on for 7 to 14 days, with all subsequent dressings being done aseptically, using vaseline, moist saline compresses, or penicillin cream as the need and state of healing indicates.

Local Applications to Burns

The wide variety of medications advocated for local use on burn sites is well known. This, in part, reflects the basic principle of attempting to correct one or more deleterious effects of the burn. The use of tannic acids was popularized in 1930 on the basis of attempting to reduce external loss of fluid from the injured site, and to fix the alleged burn toxins in situ. Triple dyes had the same principles, plus the antiseptic action of the dyes. In 1937 Koch and Allen advocated the use of the pressure bandage, to reduce internal and external fluid loss, and to reduce the incidence of contamination and infection by aseptic and infrequent dressing management. The pressure bandage technique is now a fairly standardized form of treatment and is the basis of most burn service treatment, though there remains the use of quite a variety of local medications incorporated under the pressure dressings.

There were mainly three local methods of treatment used in the cases reviewed here. They were tanning agents, sulphonamides, and vaseline, or vaseline-penicillin cream combinations under pressure.

A) Tanning Agents

Eleven cases in 1943, three in 1944, and one case since are included in the present series. We were almost invariably impressed by the unsatisfactory local response to escharotic agents. It is probable that by the improper application of the tanning agents led to heavy infection under the eschar in deep burns. The infection and delayed sloughing of the heavy eschar appeared to add to local tissue destruction, and delayed healing. Patients were frequently very uncomfortable, and nursing care was increased. In three burns of the limbs serious constrictive tourniquet effects were produced by the heavy eschar. No cases of hepatitis were demonstrated, but the danger of liver damage was apparent enough to discourage the use of tanning agents.

B) Sulphonamides

With the inauguration of the programme to standardize burn treatment at St. Boniface Hospital, the basis was a sulphonamide pressure treatment. In 1943, 68.5 per cent of burns had some form of topical sulphonamide application; in 1944, 88.6 per cent; in 1945, 65.8 per cent, and in 1946, there was a reduction to 18.9 per cent. In all, 99 patients had sulphonamide applied frequently in very liberal amounts and for prolonged periods of time. Fortunately for us, there were neither systemic toxicities nor local sensitivities developed. The increasing evidence that topical applications of any of the sulphonamides was dangerous was of sufficient weight to lead to the

discontinuance of their use in the latter part of 1945. Aside from the danger of toxicities, we found that liberal sulphathiazole emulsion dressings were a satisfactory form of local therapy.

C) Vaseline and Vaseline-Penicillin Cream Combinations

Vaseline was originally used by Koch and Allen when they advocated the pressure bandage technique of burn treatment. We have used vaseline since the latter part of 1945. As already stated, we have noted no increase in the infection rate as compared with sulphathiazole dressings. Cheapness of vaseline, and ease of handling made it a good choice. However, we have noticed two disadvantages from the use of vaseline—first, in burns of the hands and feet, the use of liberal vaseline dressings leads to marked maceration or “logging” of the thick skin; and second, the use of vaseline dressings on healing epithelium occasionally causes a mild furunculotic reaction. The latter is easily corrected by changing to applications of continuous moist saline compresses.

Penicillin creams, used either alone or in combinations with vaseline dressings, have become popular, no doubt due to the ease of application, and also to the chemotherapeutic properties of penicillin. It would seem to us that the use of topical applications of penicillin in burn therapy should be limited or dispensed with. When one realizes that penicillin activity cannot be expected to last more than a few hours, one cannot very logically justify the use of this agent solely for its chemotherapeutic properties. Furthermore, as with sulphonamides, it is becoming increasingly evident that topical applications enhance the danger of sensitivities developing. We have found two valuable uses of penicillin cream in burn treatment. In burns of hands and feet, when maceration or “logging” follow the use of vaseline, the application of penicillin under pressure “dries” out the skin. Likewise, the excessive granulation tissue responds nicely to the water-absorbing properties of the penicillin cream. We believe that the “Hydrosorb” base alone will serve the same purpose, and thus remove the danger of penicillin sensitivities developing.

D) Dry Gauze Pressure

Though we have not used dry fine mesh gauze in any cases, consideration of its use seems warranted. One of the principles of pressure bandage is based on limiting external fluid loss from the burn area. We have frequently been amazed at the speed and thoroughness with which massive pressure dressings became saturated with plasma, thus indicating a large plasma volume loss. It has been reported that whereas pressure bandages or casts applied over ointments have little effect

on the amount of fluid lost externally, that similar pressure over dry sterile gauze does limit both external and internal fluid loss appreciably. The fine mesh gauze is applied directly to the wound, and adjacent areas are incorporated in the pressure dressing to limit swelling. It is reported that epithelization under dry gauze pressure takes place at the same rate as under vaseline.

Factors Which Tend to Delay Healing

In an attempt to assess factors which led to prolonged hospitalization, an analysis of all cases which required twenty or more days hospitalization was made. There were 46 cases in this group. It is noted that total hospital days for this group fell from 718 days in 1943 to 432 days in 1946, whereas the average hospital days did not vary appreciably. In other words, it would appear that factors such as degree and extent of burns being equal, there are fewer number of cases requiring the long period of hospitalization.

Cases that come under possible controllable factors are assessed as follows:

A) Tanning Agents

In 1943, eight cases who had some form of escharotic treatment required 20 days or more hospitalization. Three cases were tanned at home, and were admitted because of infection under the eschar. Two cases of home tanning showed "tourniquet" effects of the extremities. The common features of tanning that impressed us were: further destruction of epithelial remnants; infection; necessity of surgical interference to remove eschars; and delay in preparation for skin grafting. We feel that of all local applications to burns, the escharotics were most often responsible for delayed healing.

B) Infections

Of the total 162 burn cases reviewed, 32 cases were infected on admission or became infected as the result of accident or mismanagement. Of the 32 infected cases, 16 required hospitalization of 20 days or more. Two observations are made regarding the 1943 cases. There were more infected burns admitted in 1943, and of the infected burns admitted, 72.7 per cent required 20 days or more hospitalization, as compared with the next three-year figure of 38.1 per cent. The fact that we have been able to discharge infected burns earlier is due to two reasons: first the withdrawal of escharotics from use, and second, better management. The regime that we have adopted in infected burns is the use of continuous moist sodium hypochlorite compresses. (We prefer Hygeol, dilution one to eight, finding this less irritating than Dakin's solution). With the hypochlorite compresses, we find that infection is cleared up earlier, healing is not appreciably

retarded, and earlier skin grafting is possible. It is noted that infected cases treated with ointment (sulphathiazole, penicillin) clear up more slowly than those treated with hypochlorite compresses. No appreciable significance has been noted in clearing of burn infections with the use of systemic chemotherapy. It is concluded that infection prolong hospitalization by decreasing rate of healing, increasing epithelial damage, and delaying skin grafting. Besides these local effects, the general constitutional effects of infections are self-evident.

C) Skin Grafting

Of the 46 cases in this group, 24 required skin grafting. Admittedly skin grafting frequently necessitates long hospitalization. However, in review of case records one is impressed by certain factors that might be eliminated or improved upon. The frequent findings of grafting being delayed into the second month in the earlier cases has been altered towards earlier grafting. Delay or failure of grafting may be due to one of several factors such as infection, separation of the slough, condition of the patient, and indecision as to the ultimate course of healing. Infection has already been mentioned. It is now recognized that it is impossible to render a deep burn absolutely sterile and that grafting may be carried out successfully when pathogenic organisms are present. However, it is evident that these organisms should be reduced to the minimum before grafting is attempted. Preparation of a deep burn for grafting necessitates separation of the slough. Left to itself, and depending on its vascularity, a slough will separate in three to six weeks. To speed up separation of sloughs, a form of "chemical debridement" may be used. We feel that the use of hypochlorite compresses is a useful method in speeding the separation of sloughs. To date we have not observed the use of proteolytic enzymes or pyruvic acid, which is reportedly capable of promoting slough separation in six to ten days without injury to the epithelium. Observations from records of failures and "poor takes" frequently coincide with severe constitutional debility of the patient. Severe anemia, hypoproteinemia, avitaminosis, are real factors that influence grafting, and energetic steps must be taken to prevent or correct them. After a "good" 80 to 90 per cent take there often is a long delay before healing is completed. The necessity of controlling granulation tissue at graft margins and securing full epithelial covering often takes a long time. An estimated 300 hospital days in 10 patients was required before healing was completed due to these reasons. Thus, one is impressed by the importance of securing full graft coverage of the burn wound. No less important is the

indications for grafting, both to speed recovery, and for functional and cosmetic results. For example, one ungrafted case of an infected third degree burn of the abdomen required 112 days in hospital to heal. Unless grafting is done early, contractures, ankylosis, and poor cosmetic results are to be expected.

D) Local Tissue Injury Caused by Treatment

One of the fundamental principles of local treatment to burns is the prevention of further injury to delicate epithelial remnants. Three cases hospitalized 20 days or more, were treated by direct application of various antiseptics to the burn wound. The impression drawn from these, and other cases, is that healing is delayed when antiseptic solutions are used locally. One case personally observed demonstrated deleterious results of leaving a healing burn bathed in exudate. This case of a deep dermal burn of the hand had shown good initial healing progress, but after being allowed to remain bathed in exudate and ointment for ten days, lost all epithelial remnants and required subsequent skin grafting. The practice of daily dressing adds to tissue damage, increases risk of infection, and thereby delays healing. Once epithelization is progressing satisfactorily, we feel that continuous moist saline compresses should replace vaseline dressings. We feel that with saline the rate and depth of epithelization is increased.

E) Burns to Perineum in Infants

Four cases of only moderately severe burns about the perineum in infants required 20 days or more hospitalization. Delay in healing may be attributed to the soiling of dressings and wound with excreta. An increased effort to change dressings as required and to limit time of exposure to the excreta may necessitate the attendance of special nurses for these cases. It has been suggested that the use of paregoric, to constipate the patient, is feasible in the early stages of treatment in perineal burns.

Review of Deaths

There were 14 deaths resulting from burns in the 162 cases reviewed. It is felt that more useful observations may be made by reviewing the cases collectively than individually. It is noted that there is an increasingly better application of shock therapy, local treatment, and nutritional therapy in burn management on the part of the private practitioners. Also, in a number of the burn deaths, there were extenuating circumstances which influenced the handling of the cases. In other words, the deductions arrived at from study of burn deaths are made solely on clinical and therapeutic findings.

Extent of burns leading to death ranged from 12 per cent to 95 per cent with an average of 36.5 per cent. Four cases died within 24 hours after admission to hospital, and others from one and a half to 57 days. The four cases dying within 24 hours died of shock. Four cases died with associated pulmonary complications, two of uremia, one of hyperpyrexia, and three of toxemia. In these latter cases it is realized that associated biochemical-physiological upset, toxic factors, and debility were contributing factors leading to death. Three cases had some skin grafting done, and in two of these the operative factors may have contributed to ultimate death.

Five cases came to post-mortem. No significant findings were observed that have not been reported in the literature. The case of the 95 per cent burn ((boiling fat), who lived three hours, and who received 2250 cubic centimeters of plasma, was remarkable in demonstrating tremendous plasma extravasation into subcutaneous tissues *in vivo*, and at post-mortum, findings of oedema and congestion of the lungs and peritoneum as well. One case of a deep 46 per cent burn, who died on the eighteenth day, had developed a Curling's ulcer of the lesser curvature of the stomach. The centre of the ulcer was perforated but sealed by adhesions. The ulcer was not diagnosed before death, and did not appear to contribute to his death. The spleen in this case was grossly enlarged, weighing 750 grams. It was soft and mushy, and the pulp scraped off easily. This case, and another 25 per cent burn dying on the twenty-first day, showed submucosal petechial hemorrhages of the small bowel. All livers were grossly normal, with microscopic evidence of cloudy degeneration in two cases. Likewise, the gross appearances of all kidneys were normal, but one showed albuminous degeneration of the tubules, with normal glomeruli, and another showed early pyelonephritis. Four cases showed pulmonary changes of significance; one capillary bronchitis (pre-burn origin); one lobar pneumonia; one marked oedema involving all lobes; one marked basal oedema. None of the cases showed any gross adrenal pathology.

In reviewing the deaths, there were certain recurrent and common factors that came up in the management of replacement therapy. Some cases received no plasma, others too little, and it is felt that one case received too much plasma. In many instances, the timing of replacement therapy has indicated little appreciation that replacement should coincide with rate of plasma loss. Operative interference and dressings have been carried out before anti-shock therapy was instituted. There were cases where difficulties of venoclysis interfered with initial and subse-

quent replacement therapy. The occurrence of plasma or blood reactions was not uncommon, and proved to be a serious complication to the debilitated patient.

A brief review of burn shock and its treatment may be made at this juncture. Four factors contribute to burn shock: 1. Loss of circulating plasma; 2. toxins (controversial but a fairly definite cause); 3. pain; 4. extremes of temperature. Only reduction of blood volume by loss of circulating plasma will be discussed here. Loss of circulating plasma, externally, into the burn, or into surrounding tissues, is roughly proportional to the extent of the burn. The rate of fluid loss is maximal in the first few hours after a burn, and then gradually decreases, so that at the end of 36 to 48 hours an equilibrium is reached between the fluid lost and the amount returned to the blood stream from interstitial spaces. It would appear logical that replacement should be in keeping with rate of loss. A working rule is to give 50 per cent of the estimated required plasma dosage in the first 4 to 6 hours, 25 per cent in the second 6 to 12 hours, and the rest as needed in the next 12 to 24 hours. An important factor that influences the rate and amount of plasma loss is cleansing and debridement of the burn surface. The burn skin acts as a dam against external plasma loss, and removal of this barrier, opening of blisters, and washing greatly increases the rate of loss. We have found several instances where haemoconcentration has occurred during or following the procedure.

Diagnosis of burn shock is often difficult in the early stages, and prophylactic treatment should be instituted before it is evident. One should estimate the extent of the burn, and expect cases with 15 per cent burn to develop shock, and those with 25 per cent burn to develop fatal shock unless treated. Blood pressure and pulse readings should not be relied upon for early diagnosis. With haemoconcentration attending a burn, and with increased peripheral resistance, the pulse may remain slow, the blood pressure normal for some time, even though the blood volume is greatly decreased. The best indication of blood volume loss is based on direct blood volume estimations, but these estimations are not practical for clinical work in burn cases. Studies of haematological changes (red blood cells, haemoglobin, and haematocrit estimations) give the best indications of blood volume changes in burn shock, and at the same time are useful in estimating replacement dosages. However, we must confess that haematological studies have limited application in estimating replacement dosage in this centre. Having no pre-burn haematological readings, we are at a loss to supply the various mathematical formulæ

for plasma replacement (100 cubic centimeters for every point the haematocrit exceeds the normal of 45, etc.). A relatively normal haematological finding may be seen in the presence of severe plasma depletion in an anaemic patient. For instance, a haemoglobin level of 110 per cent, found in a patient with a pre-burn haemoglobin of 70 per cent has already lost 53 per cent of his plasma volume and 37 per cent of his blood volume. Hence, we have used serial haematological readings to follow the course of blood volume changes, and have estimated dosage required by the extent of the burn and the clinical picture of the patient.

Treatment of shock should be prophylactic when possible and energetic when shock is evident. Human plasma is the agent used here. Plasma may, and should be given rapidly when shock is present. Multiple venous infusions, pressure methods, or intra-arterial administration may be given at the rate of 2000 cubic centimeters in an hour to an ordinary patient without overloading the circulatory system. As already stated, the clinical appearance of the patient, and likewise the rate of urinary output are important in guiding the rate and volume of plasma replacement.

Of the four cases dying of shock, one with a 95 per cent burn, and another with 75 per cent burn were considered hopeless on admission, though plasma was given. One baby, age 8 months, with 20 per cent burn, received no shock treatment, and died in 12 hours. Another boy, age 5, with 27 per cent burn was first debrided and dressed before receiving shock therapy. Shock became evident immediately following the dressing. After the administration of 500 cubic centimeters of plasma, he developed a plasma reaction with high fever, and expired in 9 hours. This case also demonstrated the dangers of subcutaneous administration of morphine in the presence of shock. He had received some morphine before admission and subsequently received two one-eighth grains of morphine subcutaneously. In the presence of shock, subcutaneous absorption of drugs is delayed. When blood pressure is restored, a rapid absorption of the accumulated subcutaneous medication takes place. At any rate, besides shock, plasma reaction, this case exhibited signs suggestive of morphine overdosage, which may have been a contributing factor in his unexpected death. Another case of a 9-month old infant, who received 25 per cent burns from home-applied steam inhalations for "bronchitis" had no replacement therapy. The post-mortem revealed "capillary bronchitis," but one wonders if a haemoconcentration, as revealed by a red cell count of 6,220,000 and haemoglobin of 120 per cent, was not in the main contributing

cause of death. Fear of producing pulmonary oedema should not lead to hesitancy in giving adequate plasma replacement in a large burn with pulmonary complications. However, one wonders whether the case of a 13 per cent first degree burn in a 25-year-old man did not receive too much plasma. Only moderate haemoconcentration (112 per cent haemoglobin) was recorded. After receiving 5500 cubic centimeters of plasma in the first 30 hours, clinical and X-ray evidence of infiltrative changes in the right base was noted. Another 500 cubic centimeters of plasma, rather heavy morphine sedation were given in the presence of increasing respiratory difficulties. Post-mortem findings revealed no free fluid in the pleura, hepatization of the entire right lung, and involvement of the upper left lobe. Microscopic study revealed pneumonic changes, and definite oedema of the lung fields not affected by the inflammatory process.

In five cases of this group, and in several that recovered, prophylactic or active treatment of shock was not undertaken until local treatment of the burn was carried out. As previously mentioned, washing and debridement increases rate and volume of plasma loss, and thus add to the dangers of delayed treatment of shock. General anaesthesia was given to two patients in this group, which is recognized as a dangerous procedure in the presence of burn shock. The use of general anaesthesia for initial dressings has been virtually abandoned for the past two years. We have found that with the less meticulous cleansing and debridement that patients are not caused too great discomfort.

Pressor drugs were used in several of these, and in other cases. No appreciable benefit could be detected from their use in the presence of burn shock. Adrenocortical extracts have also been used, again without any significant benefits. The initial reports of promising results by use of adrenocortical extracts have recently been reversed. From results observed, there appears to be no use for pressor drugs or adrenocortical extracts in the early burn treatment.

Rate of replacement therapy frequently has been out of keeping with rate of plasma loss. Two main reasons account for this. First, lack of appreciation of rate of plasma loss; and second, technical difficulties in introducing replacement into the circulation. Whether for shock, or subsequent replacement therapy, the inability to do venoclysis, whether due to collapsed veins, widespread burns, or thrombosis, detract greatly from the patient's chances of recovery. In four cases of this group, intravenous therapy was interrupted or discontinued because of these difficulties, and it is felt that the consequent physiological and

nutritional imbalance may have affected the ultimate outcome in three of the cases. Greater perseverance and skill on the part of the doctors and interns in securing satisfactory cut-downs should be practised. An alternate route for replacement therapy is by the marrow route. Three cases of sternal punctures done here have proved unsatisfactory.

Plasma, blood, or intravenous reactions occurred in seven cases in this group, and in two cases severe reactions were followed by death within several hours. In two other cases, protein replacement, and blood were discontinued because of recurrent reactions to the infusions. In any debilitated patient the occurrence of such a reaction is serious and alarming. At present, no useful suggestions can be offered to safeguard against these reactions that are not being carried out. The fact that there are many things to be learned about incompatibility factors in blood or plasma transfusions should be borne in mind. The dangers of such reactions are necessary risks which have to be considered when replacement therapy is essential.

There were no deaths attributed to immediate kidney failure in this group. One significant observation was noted from study of urine findings. Five of the fourteen cases (35.7 per cent) showed granular casts in the urine, as compared with four cases in the survivors (2.7 per cent). The mechanism of cast formation following burns is not clearly understood. We have come to regard the presence of granular casts as an ominous sign, and not infrequently the first indication to suspect a grave prognosis. Other writers report the presence of casts as not an uncommon finding in burns, but attach no particular significance to the finding. The urine following burning was acid in all except one of our cases. It has been suggested that immediate alkalization should be undertaken to prevent precipitation of destroyed products or red blood cells in the presence of acid urine. Every effort must be made to ensure adequate urinary output. Unfortunately, nothing could be gained by reviewing our intake-output records.

Hyperpyrexia was considered a contributing cause to one death. This man, with a 25 per cent burn, was deeply shocked on arrival. He responded fairly well to anti-shock therapy, but showed a steadily rising temperature from 99 to 106 degrees F., with corresponding rise in pulse. He died on his fourth day. It is not unusual to observe temperatures of 102 and 103 degrees F. following a burn, especially in children. The cause of this fever is not known. Infection and pyrogen reactions do not appear to be the cause, though shock and dehydration may play a part in the

hyperpyrexia. Whatever the cause, there is increased heat production and decreased ability to lose heat due to large and extensive dressings. We have not appreciated that burn patients cannot tolerate high temperatures for long periods. Active treatment to reduce temperature should not be withheld, and should be aimed at correcting dehydration and cooling the patient. This may necessitate removal of dressings until at least 50 per cent of the body is exposed, application of ice packs, and sponging.

Two deaths were related to skin-grafting operations. One boy, age 4, debilitated by fairly extensive burns treated elsewhere, was admitted to St. Boniface hospital for skin grafting. He had infected and exuding burns of the face and neck. One attempt at grafting resulted in only a partial "take." This was followed by strenuous and well-directed efforts to combat hypoproteinaemia and loss of weight. There was continued protein depletion from exudation and purulent discharge of the burn area. To correct continued protein depletion and weight loss in the presence of a debilitated patient, skin grafting was done. The patient died in nine hours following operation. The other death cannot be directly attributed to operative interference, but the necessity of grafting was a contributing cause to his death. This man, age 54, with only 12 per cent burn, had suffered combination electro-thermal burns. The electric burns, from high tension wires, resulted in several scattered, jagged, eruptive and avascular wounds and burns involving deep fascial and muscular planes. (No subsequent thrombotic progression was noted). The thermal burns were deep third degree burns of abdomen and back. Despite intensive nutritional therapy, transfusions, and amino acids, the patient developed progressive and alarming hypoproteinaemia and anaemia. To "cover-over" the sloughing and exuding wounds, skin graftings were done on the thirteenth, nineteenth, twenty-fourth, and twenty-eighth days. Following the last grafting the patient developed uraemia and died on the thirty-second day.

These two cases illustrated the dilemma that faces the attendants in handling deep burns. We have observed that deep burns, with sloughing, exudation, and healing by granulation, always result in great weight loss due to serious nutritional imbalance. Following a deep burn there is always an abnormally high excretion of nitrogen in the urine. As much as 25 to 30 grams of nitrogen may be excreted daily, and high nitrogen excretions may continue until healing is complete. The urinary nitrogen loss is not due to the high non-protein nitrogen levels following a burn, but results in part from increased protein catabolism resultant from absorption of products from the

burn area. While the urinary nitrogen loss is going on, an additional 30 to 40 grams of nitrogen may be lost daily from the burn surface. During sloughing and granulation of a deep burn, loss of protein by purulent exudate continues until healing is complete. To overcome the resulting negative nitrogen balance, patients may require five times the normal intake of nitrogen. Protein is therefore the principal replacement required. Replacement of protein by plasma is inadequate because of the small amount of protein furnished by large amounts of plasma when compared with the needs of the patient. (One thousand cubic centimeters of plasma furnish 50 grams of protein). Amino acids are a valuable adjunct in maintaining positive nitrogen balance. The principal food stuffs for oral ingestion are naturally protein, supplemented by adequate metabolic mixture containing carbohydrates, mineral, water, and vitamins. Special orders must be given regarding dietary regime, and attendants must encourage patients to eat by palatable preparation and frequent feedings. In general, the sicker the patient, the less fat is tolerated and the more protein is required. At least 25 per cent of calories should come from protein and this should be increased to 50 per cent if possible. Intubation feedings may have to be resorted to and are very useful. Starting off with 150 to 200 cubic centimeters tube feeding of a skimmed milk and water mixture, the amount may be increased and supplements of protein hydrolysates and carbohydrates may be added as quickly as the patient tolerates them. In this way 125 to 150 grams of protein may be given, plus average diet taken orally. By these methods it is possible to give patients 200 grams protein and 4000 calories daily.

Anaemia in Burns

In reviewing the 162 burn cases we have been impressed by the frequency with which anaemia develops in deep and extensive burns. It has been evident that there has been little realization that anaemia will occur in these cases. After the initial haematological studies in the early days of a burn case, there has been only haphazard checks of red cell and haemoglobin levels. The severity of the anaemia and serious aspects attending the anaemia are recorded in several cases who, undergoing skin grafting, have shown red cells well below 3,000,000 and haemoglobin levels below 6 per cent. The lowest level recorded was 2,500,000 red cells and 48 per cent haemoglobin. Not having realized the probabilities of anaemia developing, there has been little planned course of therapy directed to preventing its serious effects.

The cause of the anaemia in burns is not entirely understood. Five causes have been listed as contributing to its development:

1) External blood loss, from granulation tissues, and occasionally from the bowel.

2) Effect of heat on circulating red cells, which causes destruction and hemolysis of the red cells. Following a burn, up to 36 hours, an increased fragility of red cells is noted, which is followed by a subnormal fragility for 10 days. It has been estimated that the volume of cells hemolyzed could amount to as much as 8 per cent of the original number of pre-burn cells.

3) Internal disappearance of red cells has been demonstrated beyond that which can be accounted for by hemolysis of burns. By determining red cell mass and pigment excretion, a massive disappearance of red cells in deeply and extensively burned patients has been demonstrated. A maximum of 318 cubic centimeters of packed red cell loss daily has been demonstrated in one case, and another case of 65 cubic centimeters loss per day. Origin of this important internal loss is obscure, and has been ascribed to infection, or may be due to the disintegration of red cells at the inflammatory barrier of the burn site.

4) Failure of red cell regeneration is not definitely proven. Injection of radio-active iron and measurement of haemoglobin synthesis suggest there is appreciable slowing of regeneration. On the other hand, presence of high reticulocyte counts suggests that there is good marrow activity.

5) Pooled plasma and type O whole blood given to type A, AB, or B patients induces a persistent hemolytic process, detected by finding increased bilirubin in the plasma.

The fact that anaemia does occur in all deep or extensive burns must be borne in mind. One can foretell that the anaemia will be progressive and that its chronicity and severity will be roughly proportional to the extent of the unhealed deep burn. The anaemia does not respond to iron or liver. Blood transfusions are necessary at frequent intervals and in large amounts to maintain normal blood levels. An attempt should be made to keep blood level above 85 per cent. One case recently treated (not included in this series), with 15 per cent burn, 7 per cent of which was deep burn,

was given whole blood transfusions as prophylaxis against the expected anaemia. He received a total of 2500 cubic centimeters of whole blood, averaging 500 cubic centimeters a week. Despite the small 7 per cent area involved in deep burn, it was noted that his red cells decreased by over 1,000,000 even with transfusions. Not until skin grafts were placed was he able to maintain his blood level.

Summary

A review has been made of the 162 burn cases admitted to St. Boniface Hospital during the four-year period of 1943-1946.

Local applications applied to burn wounds have been discussed. It has been suggested that the topical applications of sulphonamides and penicillin should be discontinued.

Forty six cases requiring twenty or more days hospitalization were analyzed in order to assess factors which tend to delay healing.

Fourteen deaths from burns were reviewed. Loss of circulating plasma and problems arising in replacement therapy were discussed. Hyperpyrexia, the presence of granular casts in urine, and nutritional therapy in patients were reviewed.

Anaemia in deep and extensive burns is predictable. Treatment necessitates whole blood transfusions.

I wish to thank Dr. A. C. Abbott for his useful instructions and helpful criticisms during my work with the Burn Service. The credit for organizing the Burn Service and stimulating better burn treatment at St. Boniface Hospital belongs to him.

I also wish to thank the doctors who have made it possible for me to study their private cases.

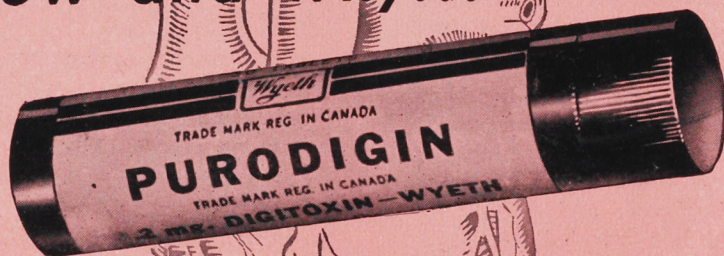
Special credit for the efficiency and continuity of the Burn Service must be given to Mrs. Smith. Her intelligent appreciation of the needs in burn therapy, her untiring efforts in the nursing care of the burned patient, and her training of student nurses in burn therapy deserve the fullest commendation.

References

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- 2) Cope, O., *Surg. Gyn. Obst.*, 1947, 84: 999-1001.



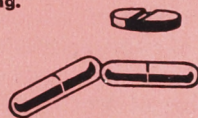
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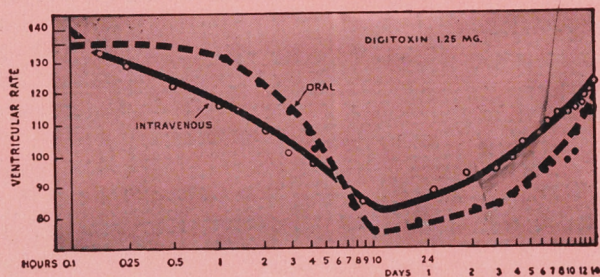
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Purodigin has the advantage of constant potency and complete absorption—it differs from digitalis in that it contains no unabsorbable or nontherapeutic components to irritate the gastrointestinal tract.



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Personal Notes and Social News

Reported by K. Borthwick Leslie

rather belated, but sincere congratulations to Dr. Charles Hollenberg, ex-Major R.C.A.M.C., O.B.E., on his fellowship in the Royal College of Surgeons, London, England. Dr. Hollenberg expects to return to Canada next year.

Dr. Roberta McQueen, daughter of Dr. and Mrs. J. D. McQueen, became the bride of Robert W. Keyes, Toronto, Ontario, on June 11th. After a wedding trip in the East, they will reside in Toronto.

Patricia Chown, daughter of Dr. and Mrs. Gordon Chown, became the bride of William Wallace Barrett, Toronto, Saturday, June 21st. Gordon may be able to relax and smile again, now that his paternal social responsibility is over.

The marriage of Evelyn Rady, daughter of Dr. and Mrs. Max Rady, to Thomas Olenick, took place Wednesday, June 11, in the Fort Garry Hotel. After a wedding trip to New York, they will reside in Winnipeg.

Dr. A. H. Hall is spending some time holidaying in Winnipeg. He has for years been practising in the Gold Coast, Africa, and has many interesting experiences to relate.

Happy landings to Drs. Margaret Owens and Anna Wilson on their trip to the Continent. Officially they carry our greetings and reports to the International Federation of Medical Women's Convention in Amsterdam, but they have planned a most interesting and heavy schedule for the remainder of their trip. We envy them heartily.

Mr. and Mrs. W. H. Sheffield, Jr., New Jersey (nee Dr. Doreen Corke, Winnipeg), are receiving congratulations on the birth of a son.

Congratulations to Dr. Fred McGuinness on his well deserved appointment as President of the Canadian Medical Association. Dr. and Mrs. McGuinness always have and always will "do us proud."

Joyce Onhauser, daughter of Dr. and Mrs. V. F. Onhauser was married to Dr. John George Colbert, only son of Mr. and Mrs. A. R. Colbert, of Vancouver, B.C., on June 28th, 1947, at Westminster United Church, Winnipeg. Following a wedding trip, the couple will reside at Dryden, Ont.

Dr. and Mrs. R. W. MacNeil announce the birth of a son (Robert William), at the Winnipeg General Hospital, on May 29th, 1947.

Dr. Alan B. McCarten and small son, Brock, have arrived in Winnipeg from London, England. Following his service in the Royal Navy, Dr. McCarten remained in England to continue his studies and in November, 1946, was awarded a Fellowship in the Royal College of Surgeons, London, England.

Your society editor knows for sure that she has neglected her job this month, and missed many items of interest, but in the words of your editor, she has been living up to that "sharp cookie, getting around." Between holidays, conventions and helping with the work of the members overseas, it has been a hectic time. Apologies presented.

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I. Kirby, W. M. M., Leifer, W., Martin, S. P., Rammelkamp, C. H., and Kinsman, J. M.: J.A.M.A. 129:940 (Dec. 1) 1945. 2. Romansky, M. J., and Rittman, G. E.: Science 100:196 (Sept. 1) 1944.

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Association Page

The Municipal Doctor Contract

The Municipal Doctor Contract was approved by the Advisory Commission under the Health Services Act, on June 2nd. Confirmation, by order of the Lieutenant-Governor-in-Council, was given on June 17th. Publication of the final copy in the Manitoba Gazette is required before the regulation becomes effective. The terms of the Contract, outlined below, are from the draft copy received from the Department of Health and Public Welfare, prior to final confirmation and is printed for information only.

Agreement for a Municipality to Employ a Municipal Physician

MEMORANDUM OF AGREEMENT made in triplicate the _____ day of _____ 19____.

BETWEEN: the City of _____
Town of _____ of _____
Village of _____
Rural Municipality of _____
(Hereinafter called "the Municipality")

OF THE FIRST PART,

AND: _____
of the _____ of _____
in the Province of Manitoba, Physician,
(Hereinafter called "the Physician")

OF THE SECOND PART.

WHEREAS the municipality desires to engage a duly qualified physician and medical officer of health for the following described territory:

(hereinafter called "the area")

AND WHEREAS the physician has agreed to enter the service of the municipality on the terms and the conditions hereafter set forth;

NOW THEREFORE THIS AGREEMENT WITNESSETH THAT, in consideration of the mutual covenants hereinafter set forth the parties hereto agree as follows:

1. (1) The physician will

- (a) enter into the employment of the municipality; as of the _____ day of _____ 19____.
- (b) reside within the territorial limits of the area; and
- (c) give medical care, attention and treatment to each and every resident of the area who requests the same without cost to such resident except as in this Agreement provided, and to the extent that such medical service and attention lies within the powers and duties of a general practitioner.

(2) The duties of a general practitioner to which reference is made in subsection (1) of this section shall be deemed to include

- (a) all medical services, including diagnosis and

treatment in the office, in the home, and in the _____ hospital;

- (b) all normal obstetrics including outlet forceps;
- (c) the performance of minor surgery, including surgical procedures that carry a fee of twenty dollars (\$20.00) or less, according to the prevailing schedule of fees of the Manitoba Medical Association;
- (d) the treatment of all simple uncomplicated fractures;
- (e) the removal of tonsils or adenoids, when necessary, only after the general practitioner has had two or more years of general practice, or is certified, to perform the operation.

but shall not include

- (a) emergency or elective surgery (exclusive of minor surgery) which the physician is capable of doing;
- (b) dental extractions;
- (c) treatment of drug or alcoholic addiction;
- (d) services covered by any other agency, e.g. The Workmen's Compensation Board or the Department of Veterans Affairs;
- (e) treatment of venereal diseases;
- (f) examinations made on behalf of life insurance companies.

(3) The physician will assume and perform all the obligations of a medical officer of health under The Public Health Act, or any other Act, or any regulation passed thereunder, or any by-law in force within the limits of the area, and will exercise therein all powers given to, and perform all duties required of a medical officer of health.

(4) The physician will give and devote his whole time to the services of the municipality as provided in this Agreement during the whole of the term of his employment; and will not practise his profession outside of the area, or devote any of his time to patients residing outside of the area who may come to him for medical care, attention, or treatment, except in cases of emergency, and then only until the patient residing outside of the area can be taken care of by another physician; provided that if any resident of the municipality requires the services of the physician as municipal physician while he is engaged in such emergency work, and by reason thereof it becomes necessary for such resident to call in another physician and he does so, the municipality may pay any expense thus incurred by the resident and deduct such expense from the salary of the physician.

(5) Services not included under the heading of duties of a general practitioner may be charged for by the physician on a basis of private arrangements between the patient and the physician, and if the prescribed fee for surgery according to the prevailing

schedule of fees of the Manitoba Medical Association exceeds \$20.00 a fee satisfactory to both parties shall be paid by the patient to the physician.

2. (1) The municipality will pay to the physician a net salary and shall contribute to a pension and insurance plan, in accordance with Schedule 1, attached, which is declared to be a part of this Agreement.

(2) The salary of the physician shall be paid in equal monthly instalments, on the last day of each and every month, during each year of his employment.

(3) All operating expenses (but not living or any other personal expenses) incurred by the physician shall be paid either:

(a) by the municipality by payment to the physician of a fixed yearly amount agreed upon between the parties as being sufficient to cover those expenses; or

(b) by payment to the physician by the municipality of all accounts submitted to it for such expenses incurred by him in the treatment of residents of the municipality as provided in this Agreement.

(4) If the municipality does not supply drugs, dressings, and similar supplies, or pay for the cost of the same as part of the physician's expenses, and if the physician supplies such drugs, dressings and supplies, or any of them, to a resident, or residents, of the municipality, he may charge such resident or residents thereof at rates that are reasonable and current.

3. (1) The employment of the physician shall continue until termination pursuant to this Agreement; but the first six months of such employment, shall be a probationary period, and during that time, the employment of the physician may be terminated on one month's notice in writing by either party.

(2) Upon completion of six months' employment, the employment of the physician shall become permanent, and may thereafter be terminated only by mutual agreement between the parties, or by either party giving to the other, three months' notice in writing to the effect.

(3) If the physician receive notice of termination pursuant to sub-section (2) of this section, and is not satisfied to accept it, and if a petition, signed by fifteen per centum of the resident ratepayers in the area, is presented to the municipality within one month before the expiration of the period fixed in the notice of termination, requesting that the agreement be not terminated, then the notice of termination of this Agreement shall have no force or effect until the matter has been submitted to a vote of the resident ratepayers in the area, in which the decision of the majority shall prevail.

4. (1) If any dispute arises between the parties concerning the terms of this Agreement, and if the parties are unable to settle it otherwise, such dispute shall be referred to the Advisory Commission

under The Health Services Act, the decision of which shall be final and binding on both parties.

(2) If any dispute arises between the physician and any resident of the area, such dispute may be referred by either of the parties hereto or by any resident to a committee consisting of the President of the Local District Medical Society, the Council of the Ward where the dispute arose and one other member appointed by the Advisory Commission who shall hear and determine such dispute and decision shall be binding on the physician and the resident.

5. The physician shall be entitled to such vacation pay in each year, following one full year's service as may be agreed by the municipality; provided that a minimum period of one full month in each year shall be allowed.

6. (1) The physician may take time from his employment to attend

(a) the annual or other business and scientific meetings of the Manitoba Medical Association.

(b) meetings of local district medical societies and

(c) if a medical officer of health, the annual meeting of the Medical Officers of Health, and when called by the Minister of Health and Public Welfare;

and no deduction shall be made from his salary by reason of such attendance.

(2) If agreed by the municipality the physician may also attend annual meetings of the Canadian Medical Association on the same terms as above set out.

7. (1) The physician may attend for two weeks in each year, without loss of pay, some approved institution of medical training for the purpose of engaging in post-graduate study; provided that, before salary for such a period is allowed, he shall produce a certificate of attendance at such an institution for the specified time to the municipal clerk of the municipality.

(2) Upon the approval of both parties, such a two week study period may be allowed to accumulate for not more than two successive years.

8. The terms of this Agreement may be altered during the currency thereof, but such amendments must be approved in writing by the Minister of Health and Public Welfare, as provided in The Health Services Act, and, if an amendment provides for the expenditure of additional moneys by the municipality, it shall be subject to a by-law being submitted to and passed by a vote of the resident ratepayers in the area as provided in the said Act; provided that, if the by-law submitted as above is not passed, all payments made before the taking of the vote, pursuant to the amendment of the Agreement, shall be as valid as if the by-law had been passed.

For the purposes of this Agreement "resident" means a person who has been resident in the area for at least thirty days prior to the date on which his qualification as a resident comes into question.

10. This Agreement shall be deemed to be in effect as from, and after the _____ day of _____ A.D. 19____, and until such time as it is terminated under the terms hereof.

IN TESTIMONY WHEREOF the municipality has hereunto affixed its corporate seal, attested by the hands of its proper officers in that behalf, and the physician has hereunto set his hand and seal the day and year first above mentioned.

Reeve, or Mayor.

(Seal of
Municipality)

Secretary-Treasurer.

Signed, Sealed and Delivered)

by the physician in the)

presence of) _____ M.D.

(_____) Physician.

of the _____ of _____

in the Province of Manitoba.

APPROVED this _____ day of _____ A.D. 19____

in the presence of (Seal of

Department)

Minister of Health and Public Welfare.

(4) If the municipality does not supply drugs, dress-

This is

SCHEDULE I

Attached to an Agreement

BETWEEN the (Rural Municipality of _____

(City of _____

(Town of _____

(Village of _____

(in the Province of Manitoba. _____

AND: _____ Physician,

of the _____ of _____

in the Province of Manitoba,

Dated the _____ day of _____ A.D. 19____.

1. The physician shall be entitled to a salary based on an annual salary subject to any deduction required to be paid by the municipality under this Agreement but excluding from such deduction any sum on the part of the municipality agreed to be contributed as follows:

(a) A physician engaged during the period between the date of his graduation in medicine and the first anniversary date thereof, shall receive,

(i) During the period between the date of his employment and the date of the first anniversary of his graduation in medicine a salary at a rate based on an annual salary of \$3,600.00.

(ii) During the period between the first anniversary date and the second anniversary date of his graduation in medicine a salary at a rate based on an annual salary of \$3,800.00.

(iii) During the period after the second anniversary date of his graduation in medicine a salary at a rate based on an annual salary of \$4,000.00.

(b) A physician engaged under this Agreement during the period between the first and second anniversary date of his graduation in medicine shall receive,

(i) During the period between the date of his employment and the second anniversary date of his graduation in medicine a salary at a rate based on an annual salary of \$3,800.00.

(ii) During the period after the second anniversary date of his graduation in medicine a salary at a rate based on an annual salary of \$4,000.00.

(c) A physician engaged under this Agreement after the second anniversary date of his graduation in medicine shall receive a salary at a rate based on an annual salary of \$4,000.00.

(d) When a physician does not engage in actual practice after date of his graduation in medicine, any period not spent in actual practice shall not be computed in any of the periods provided for by paragraph (a), (b) and (c) hereof.

2. Notwithstanding the provisions of Section 1, where a physician produces to the municipality a certificate of the Special Board of the Medical Faculty of the University of Manitoba certifying proficiency in tonsillectomies and adenoidectomies such physician shall be entitled to receive and shall be paid a salary at a rate based on an annual salary of \$4,000.00 per annum.

3. After reaching a salary at a rate based on an annual salary of \$4,000.00 the physician shall, if he has engaged in post-graduate study in an approved institution of medical training as provided in Section 7 of the Agreement, be entitled to receive an annual increment of \$500.00 per annum for each succeeding year, until a maximum of \$6,000.00 per annum is attained.

Pensions

4. The physician shall

(a) when single, forthwith after commencing his employment under this Agreement enter into a contract with the Dominion Government Annuities Branch of the Department of Labor to purchase on an annual payment basis a Deferred Annuity providing for an annuity payment of \$1,200.00 per annum commencing from the date of his attaining the age of 60 years; or

(b) when married, forthwith after commencing his employment under this Agreement, and if married subsequent to his employment upon date of such marriage contract to purchase on an annual payment basis a Dominion Government Deferred Annuities providing for an annuity payment of \$1,200.00 per annum each for himself and his wife commencing from the date each annuitant attains the age of 60 years.

5. The municipality shall contribute annually a total of not less than \$200.00 towards the cost of such annuity or annuities and shall deduct the difference between the said sum of \$200.00 and the total annual payment

or payments of such annuity or annuities from the annual salary of the physician and shall pay to the Annuities Branch of the Department of Labor of Canada the annual payment or payments payable in connection with such annuity or annuities.

Insurance

6. The physician shall forthwith after the commencement of his employment use his best endeavours to secure a policy of accident and sickness insurance which will pay him not less than \$50.00 per week for any period or periods which, during the currency of the Agreement, he is, by reason of accident or sickness, incapacitated from carrying out his duties thereunder. Subject to the foregoing the selection of an insurance company and the form and type of insurance shall be left to the discretion of the physician.

7. The municipality agrees to contribute the annual

premium for such weekly indemnity coverage up to an amount not exceeding \$100.00.

8. The insurance received by the physician as above provided for shall be in lieu of his salary during his period of incapacity.

Indemnity

9. The physician covenants with the municipalities that he will at all times hereafter save harmless and keep indemnified the municipality, its successors and assigns from and against all losses, costs, expenses, and damages which may be incurred by it by, or by reason of, any action or other proceedings which shall, or may be brought, or instituted against the municipality for or in respect of, any act or omission of the physician in the carrying out of the duties of his position, or any assumed, or alleged duties, or any matter or thing arising directly or indirectly out of, or by reason of, this contract.

Obituary

Dr. William Lawson Mann

Dr. William Lawson Mann, distinguished as scholar, chest surgeon, medical director and public citizen, was drowned at Minaki, Ontario, on May 31, when his boat capsized.

Born at Stockton-on-Tees, Durham, England, in 1885, he came with his parents in 1903 to the original Barr colony at Lloydminster, Alta. Two years later he entered Wesley College, Winnipeg, where he obtained his B.A. degree, then went to the Medical College graduating M.D., C.M., in 1914. Throughout his scholastic career he stood consistently at or near the top of his class. Soon after his graduation World War I broke out. In 1915 he went overseas as an officer with No. 3 Canadian Casualty Clearing Station, headed by the Late. Lt.-Col. R. J. Blanchard. During the war he earned distinction as a chest surgeon. His attention had been turned to diseases of the chest when he served under the late Dr. D. A. Stewart

at Manitoba Sanatorium, Ninette.

Returning to Winnipeg in 1919 he engaged in practice, especially chest surgery, and was appointed Associate Professor of Clinical Surgery University of Manitoba. In 1926 he joined the Great-West Life Assurance Company of Winnipeg as associate medical referee. In 1931 he became chief medical referee and in 1946 medical director. He was a Fellow of the Royal Canadian College of Surgeons and the American College of Surgeons. He contributed papers on chest conditions to the Canadian Medical Association Journal in 1924 and the London Lancet and the British Medical Journal in 1930.

He was a member of the Board of Governors of the University of Manitoba, of the Y.M.C.A. Board of Directors, and of the Manitoba Club, the St. Charles Country Club and the Winnipeg Winter Club.

His widow, a sister of Professor R. Fletcher Argue, a son and three daughters and three grandchildren survive him.

Bathers, Beware Swimmer's Itch

With the swimming season opening, the Manitoba Department of Health and Public Welfare issue a warning about "swimmer's itch," that annoying complaint that shows up almost every summer in various lakes and streams around the province.

"Swimmer's itch" is caused by a little fork-tailed parasite. The organism is known as a cercaria. It is about one millimeter long, just barely visible to the unaided eye. Cercariae are spread by a certain species of snail that inhabits

sandy beaches and shallow weed beds in lakes and streams. A single infested snail may produce thousands of cercariae every day for several weeks.

Usually the daily "crop" of cercariae leaves the snail in the early morning and swims away toward the light. In a heavily infested spot myriads of these little fork-tails will be swimming in the surface water over snail beds, with the highest concentrations occurring during the afternoon hours, most popular with bathers. The

(Continued on Page 449)

Winnipeg Medical Society Committee Reports

Secretary's Report

To the President and Members of
The Winnipeg Medical Society:

The Society has enjoyed a very satisfactory year, just past. Many members, after several years in the Service, have returned and are now again actively engaged in practice; and many new members have been added to our roster. Our present membership is the highest in the history of the Society. The new members have shown a great interest by attending Meetings, contributing to the scientific programme and discussions and working on committees: the average attendance at regular Meetings has risen to approximately 150. This has necessitated the use of Theatre A with its greater accommodation.

During the past year seven regular Meetings and one special Meeting were held. The Council held 10 Meetings, which were well attended.

A resume of the non-scientific activities of the Society may be summarized as follows:

1. During the past year and due to the initiative of the President, the machinery for a Benevolent Fund has been set up. This Fund will, it is hoped, take care of any special educational costs and assist any needy members. It is expected that as time goes on it will occupy a significant place in the Society.

2. The Council decided that the complimentary membership to ex-service medical officers would be discontinued at the end of this calendar year.

3. The Society is now committed to an Annual Grant to the Library Committee of \$500.00, and an increase of \$40.00 a month for secretarial help. Council felt that an increase in the Annual dues will be necessary.

I would like to take this opportunity on behalf of the Executive to thank all those who took part in the scientific programmes and discussions. Also to express appreciation to the various committee members. The work and enthusiasm of these individuals contributed greatly to a successful year.

Respectfully submitted.

R. A. Macpherson,
Secretary.

Standing Committee

To the President and Members of
The Winnipeg Medical Society:

Annual Report of the Standing Committee for Program of the Winnipeg Medical Society for 1946-1947:

The Committee, consisting of the following members:

Doctors L. R. Coke
H. G. Scarrow
W. H. Riley
S. Israels
R. E. Beamish
A. R. Tanner, chairman,

was called together in September, 1946, and a plan for program was discussed for the year's meetings. It was agreed that the majority of papers should be of general interest, with an attempt to cover the field of general medicine and surgery. Suggestions were made for the invitation to outstanding specialists from outside centres to visit and address the Winnipeg Medical Society and this suggestion was discussed with and received the general approval of the Executive of the Winnipeg Medical Society. However, the suggestion was not acted upon during this season's activities, but is passed on to the next Program Committee.

During the year 7 regular meetings were held and one special meeting and a total of 14 papers were given, and one medical motion picture was shown.

The Society had the good fortune to be addressed by the following visiting speakers:

Dr. R. G. Ferguson, Medical Director of the Anti-Tuberculosis League of Saskatchewan. "B.C.G. Vaccination in Hospitals and Sanatoria of Saskatchewan. (A study carried out by the National Research Council of Canada)."

Dr. Rudolph A. Peters, Professor of Biochemistry, Oxford University. "The Development of British Anti Lewisite."

Dr. T. C. Routley, General Secretary, Canadian Medical Association. "World Health Organization."

Dr. A. G. McKinnon, Norman Wells, N.W.T. "Pulmonary Type of Tularemia."

Dr. A. W. Trueman, President of the University of Manitoba, addressed the Society at the April meeting on "The Doctor in Literature."

The following papers were presented by members of the Society:

Functional Colon Disorders: Dr. Wendell Macleod.

Caesarean Section—A Review: Dr. Alex. Andison.

Semi-direct Electrograms to Demonstrate Auricular Activity: Dr. Frank Mathewson.

The Bridging of Bone Defects: Dr. B. E. Loadman.

A Symposium on Paraplegia: Drs. O. S. Waugh, David Swartz, P. T. Green, E. W. Pickard.

A Series of Harelips and Cleft Palates: Dr. J. S. McInnes, Prof. I. Maclaren Thompson.

Some Indications for Bronchoscopy: Dr. C. B. Schoemperlen.

A Report on the Rh Factor: Dr. Bruce Chown, Dr. Anna Bryce.

Current Methods in the Treatment of Heart Disease: Dr. L. R. Coke.

The Motion Picture "The Use of Sulfathalidine in the Treatment of Ulcerative Colitis" was shown by courtesy of Sharpe and Dohme.

Respectfully submitted.

A. R. Tanner,
Chairman.

Legislative Committee

To the President and Members of
The Winnipeg Medical Society:

(1) No meetings of the Committee, as such, were held during the past year.

(2) A meeting was attended on 23rd February, 1947, at which the Minister of Health met the Committee of Fifteen and discussed proposed changes in medical legislation.

Proposed Amendments to the Marriage Act

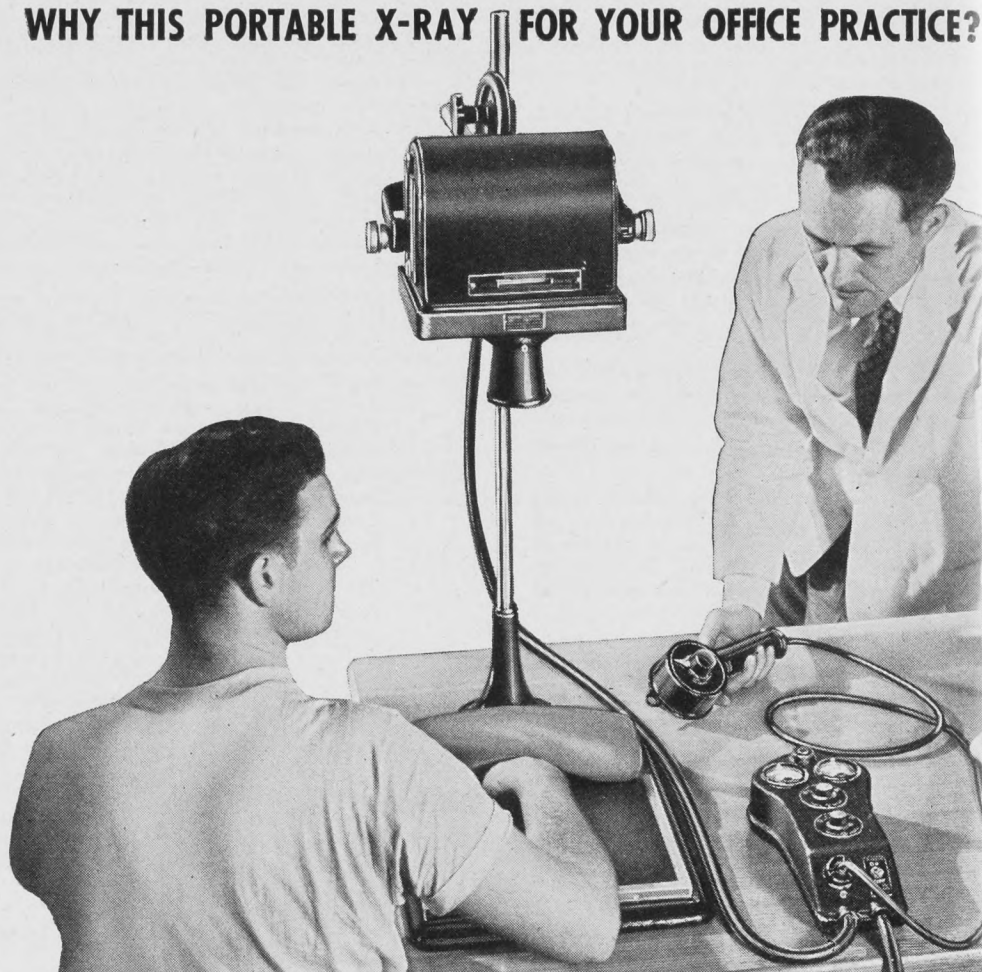
(1) Whereas previously the Act stated that blood samples would be taken by the physician personally, the amendment Act would permit the physicians lab technician, etc., to take the sample.

(2) Whereas previously it was required that the physician personally hand to the patient the completed report, the redraft permits the report and the statement to be sent to the applicant by mail where the report shows that the applicant is not infected with syphilis.

(3) Added subsections provide for the issue of certificates in the case of non-residents of Manitoba. The non-resident is obliged to apply to the Recorder of Vital Statistics and to produce a report from an approved Laboratory.

(4) Provision is also made for issuing certificates to residents of isolated areas of the Province, where unwarranted delay

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the marriage would result from full compliance with the Act.

Proposed Amendments to the Child Welfare Act

Proposed Amendments to the Child Welfare Act were discussed as well as amendments to the Anatomy Act, the latter with a view to increasing material for the Medical College.

The Basic Science Act

The Basic Science Act was discussed briefly. The acceptance of graduates from other colleges acceptable to the Advisory Board was considered. It was felt that this should be done by arrangement with the Advisory Board rather than by amending the Act with the consequent danger of opening the door for other groups.

Proposed Amendment to the Health Service Act

These amendments have apparently been the subject of more interest and concern to the profession than any other of recent years. In particular Sec. 56—dealing with the provisions of bursaries to undergraduate students was to be deleted.

This immediately removes such bursaries from any control of the Advisory Commission to the Act. The effects of such change are far-reaching, and have been strongly objected to by the Advisory Commission.

At the time of writing this report, no accurate information can be given as to the outcome of the above proposed amendments to existing legislation.

All of which is respectfully submitted.

Ross H. Cooper,
Chairman.

Library Committee

To the President and Members of The Winnipeg Medical Society:

Your representative has been present at all the meetings, always protected, of the Medical Library Committee during the past year.

The Library has outgrown its present quarters and increasing use is being made of its contents. The number of loans made in 1946-47 was 10,870, an increase of 50 per cent over the previous year, and of 300 per cent over the year 1926-27.

The volumes added by purchase in the last year from the Winnipeg Medical Society grant were—books 19, binding 8, a total of 27 or 9% of the total 291 purchased. The number of books purchased on all funds shows an increase of 82 volumes or 31.78% over 1945-46. The library now has 15,473 volumes including books and all journals, bound or unbound volumes.

Journals and serials received by subscription on University funds number 186 titles. The total estimated annual cost of these periodicals or serials is \$1,530.00.

What the library means to Winnipeg physicians is shown by the figures that 254 or over 51% of the 496 city physicians were registered borrowers in 1946-47. Loans to Winnipeg physicians totalled 5,120 items or over 47% of all loans in that period.

The convener of the Library Committee has informed me that on the basis of a yearly grant of \$500, the Winnipeg Medical Society is behind to the amount of \$600. In your representative's opinion this indebtedness should be wiped out as soon as possible. The Society's indebtedness has already created disagreeable repercussions from private donors. The library is valuable and every effort is made by the Library Committee to keep it up to date and to exercise discrimination so that only the best in current medical literature is purchased. Carlyle has said that the true University of today is a collection of books. No physician can do his work properly without reference to books.

Respectfully submitted.

Ross Mitchell,
Chairman.

Membership Committee

To the President and Members of The Winnipeg Medical Society:

The total membership of the Winnipeg Medical Society for the 1946-47 season is 504. This broken down shows we have lost 9 members by death, 18 have left the city, 1 has retired from practice, and there are 29 members whose fees are unpaid. This leaves, according to our Auditor's statement, 447 members in good standing in our Society. A further breakdown of these 447 members shows 220 Active members, 19 Associate members, 18 Honorary members, and 190 Complimentary members who have returned from the Armed Forces and are eligible for this category.

There were 80 new members added during 1946-47. Last year's membership reached an all time peak of 365. The increase this year is most gratifying and I would like to thank the Membership Committee for their valued assistance.

Respectfully submitted.

Thomas A. Lebbetter,
Chairman.

Eye, Ear, Nose and Throat Section

To the President and Members of The Winnipeg Medical Society:

The Eye, Ear, Nose and Throat Section of this Society met four times during the year.

In November, 1946, Mr. T. Veitch, of New York City, discussed "Contact Lenses" and described, in detail, the method of testing the eyes for contact glasses, which he has developed in the past year or two.

Dr. Joseph Sullican, Assistant Professor of Otolaryngology, University of Toronto, presented a paper in December, 1946. The topic of the paper was "Treatment of Intractable Vertigo."

In March, Dr. Chris. Adamson discussed the subject of "Allergy in Relationship to the Eye, Ear, Nose and Throat."

The last meeting of the year will be held this month, at which time it is hoped to have Dr. Arthur Childe discuss "The Use of X-ray in the Diagnosis of Ear, Nose and Throat Symptoms."

There will be an election of new officers.

President Dr. I. H. Beckman
Secretary Dr. W. Alexander

Respectfully submitted.

Walter Alexander,
Secretary.

Anaesthesiological Section

To the President and Members of The Winnipeg Medical Society:

Since your last annual meeting the Anaesthesiology Section of the Winnipeg Medical Society has held seven monthly meetings, commencing in November, 1946. The June Meeting will be held during the C.M.A. convention.

Our regular meetings have been held on the first Tuesday of each month, usually in the Medical Arts Club rooms. The officers for the past season were:

President Dr. P. C. Lund
Secretary-Treasurer Dr. Dan. Revell
Councillor Dr. Clive Neilson

The incoming executive, elected May 13, consists of:

President Dr. A. C. Rumball
Secretary-Treasurer Dr. Marjorie Bennett
Councillor Dr. Dan Revell

These officers will commence duties next September.

As our society, which began as the Winnipeg Society of Anaesthetists, became the Manitoba Division of the Canadian Anaesthetists' Society—As well as being a section of the Winnipeg Medical Society—we have adopted the constitution of

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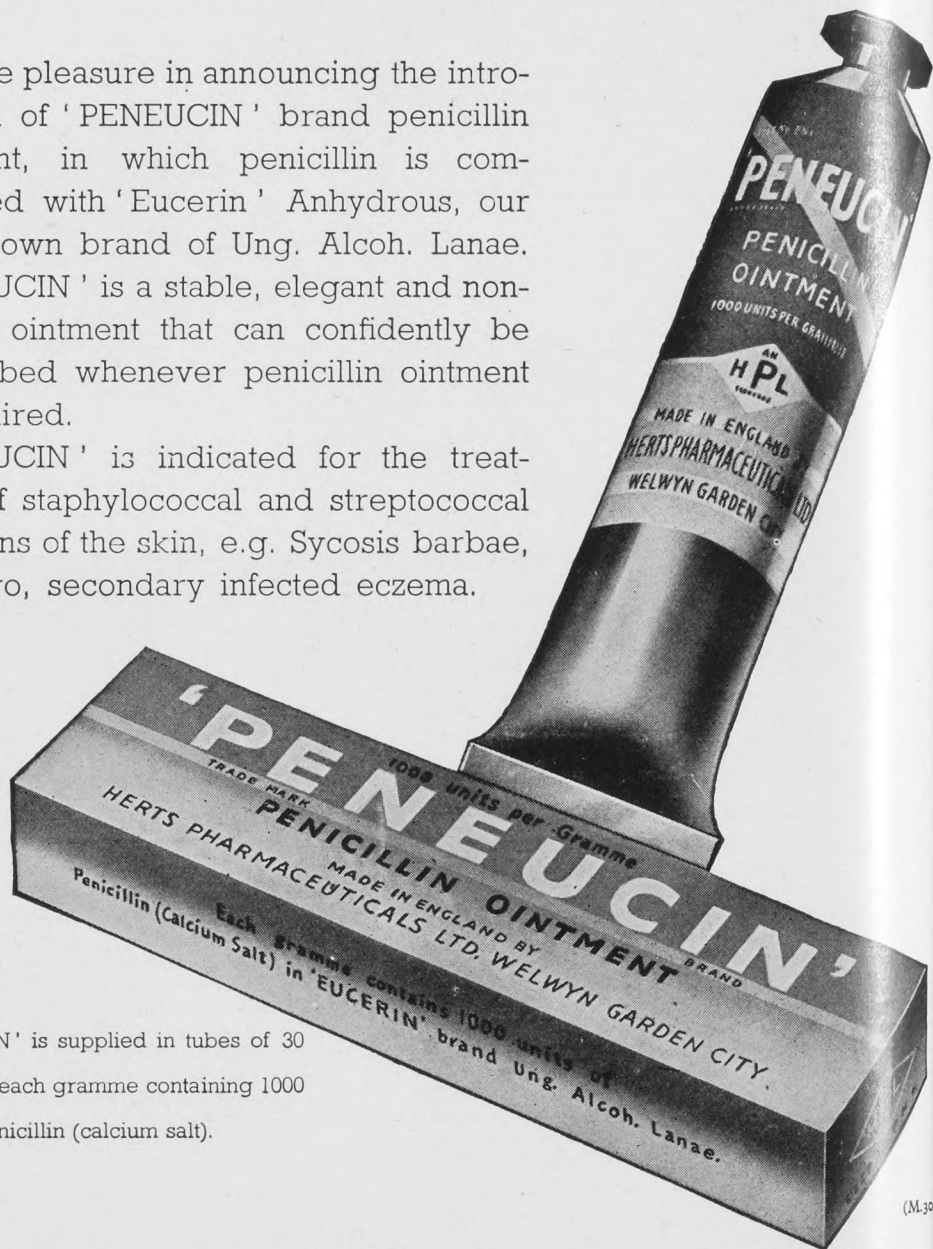
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the C.A.S. with slight modifications to suit local conditions. Our councillor to this Canadian society has been Dr. D. C. Aikenhead. It is expected that after the June Meeting of the Council of the C.A.S. our representative on the council will consist of our Divisional President.

Our membership numbers twenty, with occasional attendance by seven interns, residents or part time anaesthetists. Of our members eleven are certified as specialists in Anaesthesiology by the Royal College of Physicians and Surgeons of Canada. We have had an average attendance of 18 at this past season's meetings.

Speakers for our meetings did not include any from outside the city but we had representatives from the Anatomy, Physiology and Pharmacology Departments of the Manitoba Medical College address us on preclinical topics related to our specialty. Clinically, the Professor of Medicine gave us an excellent talk of the Assessment of Anaesthetic Risks. One recent meeting was devoted to a discussion of Obstetrical Anaesthesia and Analgesia. Several Winnipeg obstetricians attended and took part. It was established that there is a serious need in Winnipeg for the availability of trained anaesthetists for

obstetrical service. The problem seems to be one of personnel and remuneration. An improvement in the situation is expected soon.

This year Alberta was host for the Second Annual Meeting of the Western Provincial Divisions of the C.A.S. This meeting was well attended by members from the four western provinces, there being five members from our local society present. The visiting speaker was Dr. William Cassels from Chicago, a former Edmontonian.

During the coming C.M.A. convention our provincial division will operate as the section on Anaesthesiology, under the chairmanship of Dr. D. C. Aikenhead. Symposia and papers will be presented by visitors from Quebec and Ontario, as well as our local members.

It is felt that this section of the Winnipeg Medical Society has made definite progress, and we are looking forward to another interesting and profitable year.

Respectfully submitted.

Dan. G. Revell,
Secretary-Treasurer.

Treasurer's Report

To the President and Members of
The Winnipeg Medical Society:

Herewith certified financial statement from our auditors, Messrs. Thornton, Milne & Campbell.

Respectfully submitted.

Cherry K. Bleeks,
Treasurer.
May 12th, 1947.

To the President and Members,
The Winnipeg Medical Society,

We have audited the accounts of the Association for the period from 7th May, 1946, to 8th May, 1947, and submit herewith the following relative financial statements:

EXHIBITS:

"A" Balance Sheet as at 8th May, 1947.

"B" Statements of Receipts and Disbursements for the period ended 8th May, 1947.

The operations for the year, as set forth in Exhibit "B," have resulted in an excess of Receipts over Disbursements of \$40.12. Membership fees received are in accordance with duplicate receipts examined by us but are not subject to further verification. Receipts include \$200.00 from the Manitoba Medical Service, being a refund on monies advanced to this Association in previous years. Expenditures have been sufficiently authorized and vouched.

In accordance with the Minutes of November 15th, 1946, and subject to the Minutes of May 15th, 1946, the sum of \$800.00 has been placed in the Special Library Fund for the use of the Library Committee of the Faculty of Medicine. A statement of the transactions affecting this account during the period is shown on Exhibit "B."

We obtained from the Bank of Toronto verification of the bank balances, subject to allowances for outstanding cheques as shown by the books.

The Association's investments comprise the following issues of Dominion of Canada bonds:

Par Value	Cost	Market Value
\$1,000.00 Dominion of Canada 3%, 1952, \$	987.50	\$1,032.00
1,000.00 Dominion of Canada 3%, 1957, 1,000.00	1,000.00	1,051.25
\$2,000.00	\$1,987.50	\$2,083.25

These securities are lodged with the Bank of Toronto for safekeeping and are in accord with confirmation received from the Bank. All interest, on a received basis, has been duly accounted for on the books of the Association.

To the best of our knowledge and belief all liabilities applicable to the period under review have been recorded on the books.

In conclusion we wish to express our appreciation of the courtesies extended to us during the course of our work.

Yours very truly,

THORNTON, MILNE & CAMPBELL,
Chartered Accountants.

Balance Sheet Exhibit "A" As at 8th May, 1947 ASSETS

Cash:	
On deposit with Bank of Toronto	\$ 470.64
Investments—At Cost:	
\$1,000 Dominion of Canada Bonds, 1952 — 3%	\$ 987.50
\$1,000 Dominion of Canada Bonds, 1957 — 3%	1,000.00
	1,987.50
Office Furniture and Equipment — Book Value	218.54
	\$2,676.68
Special Library Fund:	
Cash:	
On deposit with Bank of Toronto	516.71
	3,193.39

LIABILITIES	
Membership Fees Paid in Advance	\$ 40.00
Surplus:	
Balance as at 7th May, 1946	\$2,496.56
Less:	
Appropriated for Library Fund	500.00
Add:	\$1,996.56
Excess of Receipts over ordinary operations	640.12
	2,636.68
	\$2,676.68
Special Library Fund Reserve:	
Surplus:	
Unexpended Balance, 7th May, 1946	\$ 122.24
Add:	
Excess of Receipts over Disbursements	394.47
	516.71
	3,193.39

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Statements of Receipts and Disbursements For the period ended 8th May, 1947

RECEIPTS

General Funds:	
Annual Dues:	
Active Members	\$1,100.00
Associate Members	38.00
Payment of Arrears	25.00
	<hr/> \$1,163.00
Bond Interest	75.00
Bank Interest	43.00
Manitoba Medical Service	200.00
	<hr/> \$1,481.00

DISBURSEMENTS

General Funds:	
Salaries	\$ 465.61
Printing, Stationery and Postage	143.04
Catering	44.27
Telephone	27.60
Lantern Expense	33.90
Audit Fees	25.00
Donations	2.00
General Expense	61.38
	<hr/> 802.80
Excess of Receipts over Disbursements	\$ 640.00

Library Fund

RECEIPTS

Appropriated from General Surplus	\$ 500.00
Bank Interest	3.12
	<hr/> \$503.12

DISBURSEMENTS

Books Purchased — Colcleugh and Co.	108.00
Excess of Receipts over Disbursements	\$ 394.12

Bathers, Beware Swimmer's Itch

(Continued From Page 441)

cercariae must find a suitable host within a few hours or perish. An unwary swimmer will serve the purpose. After penetrating the skin, the cercariae burrow a short distance, die, and are gradually absorbed. This process causes a rash that remains only a short time, but is exasperating while it lasts.

Copper salts spread in the water over limited areas, may be used in controlling this parasite but should not be used indiscriminately, because they are dangerous to fish and other aquatic life as well as to cercariae.

Another method of controlling the nuisance is to remove all vegetation and snails by hand-picking around the beach. Swimmers may often avoid getting the "itch" by rubbing themselves vigorously with a coarse towel immediately after leaving the water. Persons wishing to clear up a beach by the use of copper salts should ask for advice and assistance from the Department of Health and Public Welfare.

Department of Health and Public Welfare

Comparisons Communicable Diseases — Manitoba (Whites and Indians)

DISEASES	1947		1946		TOTALS	
	Apr. 20 to May 17, '47	Mar 23 to Apr. 19, '47	Apr. 21 to May 18, '46	Mar 24 to Apr. 20, '46	Dec. 29, '46 to May 17, '47	Dec. 30, '45 to May 18, '46
Anterior Poliomyelitis	0	0	0	0	0	1
Chickenpox	72	80	73	65	441	529
Diphtheria	6	9	13	20	44	84
Diphtheria Carriers	2	2	1	0	10	8
Dysentery—Amoebic	0	0	0	0	0	1
Dysentery—Bacillary	0	0	0	0	1	1
Erysipelas	5	2	4	8	21	39
Encephalitis	0	0	0	0	1	0
Influenza	19	17	11	21	55	153
Measles	892	1193	172	65	5364	314
Measles—German	10	8	1	8	28	12
Meningococcal Meningitis	1	1	2	1	7	7
Mumps	140	201	316	356	1002	1311
Ophthalmia Neonatorum	0	0	0	0	0	0
Pneumonia—Lobar	19	18	13	20	86	86
Periperal Fever	0	0	0	0	1	0
Scarlet Fever	24	17	27	53	103	273
Septic Sore Throat	1	1	1	3	8	20
Smallpox	0	0	0	0	0	0
Tetanus	0	1	0	0	1	0
Trachoma	2	0	0	0	2	0
Tuberculosis	88	87	77	114	308	336
Typhoid Fever	0	0	2	2	0	8
Typhoid Paratyphoid	0	0	1	0	0	1
Typhoid Carriers	0	0	0	2	1	1
Undulant Fever	2	0	1	1	3	8
Whooping Cough	165	83	36	36	470	147
Gonorrhoea	104	151	208	178	650	963
Syphilis	44	48	47	57	222	273
Diarrhoea and Enteritis, under 1 yr.	6	11	7	17	41	42

Four-Week Period Report, April 20th to May 17th, 1947

DISEASES	Manitoba	Ontario	Saskatchewan	Minnesota
(White Cases Only)				
Approximate population.	*718,699	*3,825,000	*906,000	*2,962,000
Anterior Poliomyelitis	1	1	1	2
Chickenpox	72	1115	111	26
Diphtheria	6	5	3	26
Diarrhoea & Enteritis (under 1 yr.)	6	1	2	2
Dysentery—Amoebic	7	7	1	1
Erysipelas	5	8	1	1
Infectious Jaundice	2	2	1	1
Influenza	19	9	1	2
Leth. Enceph.	1	1	1	1
Malaria	1	1	1	1
Meningococcal Meningitis	1	4	1	4
Measles	892	721	175	1928
Measles, German	10	204	39	1
Mumps	140	1642	346	1
Pneumonia, Lobar	19	1	1	1
Psittacosis	1	1	1	1
Scarlet Fever	24	322	6	198
Septic Sore Throat	1	1	1	1
Trachoma	2	1	1	1
Tuberculosis	88	124	50	5
Typhoid Fever	4	4	1	1
Typh. Para-Typhoid	4	4	1	1
Undulant Fever	2	7	1	14
Whooping Cough	165	399	5	138
Gonorrhoea	104	284	1	1
Syphilis	44	220	1	1
Diphtheria Carriers	2	1	1	1

DEATHS FROM COMMUNICABLE DISEASES

For 3-Week Period April 29th to May 20th, 1947

Urban—Cancer, 47; Pneumonia, Lobar, 2; Pneumonia (other forms), 7; Syphilis, 1; Tuberculosis, 7; Hodgkin's Disease, 2; Diarrhoea & Enteritis (under two years), 3; Diseases of the Skin, 1. Other deaths under 1 year, 18. Other deaths over 1 year, 159. Stillbirths, 16. Total, 193.

Rural—Cancer, 16; Influenza, 5; Lethargic Encephalitis, 1; Measles, 1; Pneumonia, Lobar, 6; Pneumonia (other forms), 6; Syphilis, 1; Tuberculosis, 10; Diarrhoea & Enteritis (under two years), 1. Other deaths under 1 year, 20. Other deaths over 1 year, 127. Stillbirths, 11. Total, 158.

Indians—Pneumonia, Lobar, 1; Pneumonia (other forms), 3; Tuberculosis, 3; Chickenpox, 1. Other deaths under 1 year, 4. Other deaths over 1 year, 5. Stillbirths, nil. Total, 9.

Poliomyelitis—None in Manitoba to date (June 12th) this year. There has been the occasional case in Ontario and Minnesota. The season for this disease is approaching so we should be on guard.

Measles—The epidemic in Winnipeg is on the wane but in many rural areas there are many cases.

Gonorrhoea shows a one-third decrease compared with the same period in 1946 and **syphilis** also shows a smaller but definite decrease.

Scarlet Fever—The new tannic acid precipitated toxin for immunization against this disease is now available. It is given **intradermally** in **three** doses at three-week intervals. The smallest size package contains sufficient for ten persons as each dose is only 0.1 c.c.

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